1566123 FINAL

Removal Action Work Plan
High Street Outfall and 40th Avenue Storm Sewer System

Vasquez Boulevard/Interstate 70 Site, Operable Unit #2

Prepared for:

City and County of Denver
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June 19, 2015

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LIST OF ACRONYMS

ACM	Asbestos-Containing Material
AoC	Agreement and Order on Consent
bgs	Below ground surface
BMPs	Best Management Practices
CCoD	City and County of Denver
CCR	Construction Completion Report
CDOT	Colorado Department of Transportation
CDW	Construction Dewatering
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Compound of Concern
EMSI	Engineering Management Support, Inc.
EPA	Environmental Protection Agency
ESD	Explanation of Significant Difference
FSP	Field Sampling Plan
HASP	Health and Safety Plan
LEL	Lower Explosive Limit
mg/kg	milligram per kilogram
MMP	Materials Management Plan
PAHs	Polynuclear-aromatic Hydrocarbons
% v/v	percent by volume
OU-2	Operable Unit #2
QAPP	Quality Assurance Project Plan
RACS	Regulated Asbestos-Contaminated Soil
RAWP	Removal Action Work Plan
RD/RA/O&M	Remedial Design/Remedial Action /Operations and Maintenance
RMP	Records Management Plan
ROD	Record of Decision
RPM	Remedial Project Manager

RTD	Regional Transportation District
SAP	Sampling and Analysis Plan
SoW	Statement of Work
SVOCs	Semi-volatile Organic Compounds
TCRA	Time-Critical Removal Action
TSDF	Treatment, Storage, and Disposal Facility
VOCs	Volatile Organic Compounds

1 INTRODUCTION

This Removal Action Work Plan (RAWP) was prepared on behalf of the City and County of Denver (Respondent) pursuant to Section II.4 of the Statement of Work (SOW) attached to the Administrative Settlement Agreement and Order on Consent (AOC) for Removal Action in a Proceeding Under Sections 104, 106(a), 107 and 122 of the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§ 9604, 9606(a), 9607 and 9622 regarding the Vasquez Boulevard/Interstate 70 (VB/I70) Site Operable Unit 2 (OU2).

1.1 Background

Work under this Removal Action entails design and implementation of the "environmental components" of an open channel stormwater drainage feature to be constructed through a portion of Operable Unit 2 of the VB/I70 Superfund site. The open channel stormwater drainage feature is part of a larger project that is intended to reduce flooding in the Montclair Drainage Basin area and address stormwater management needs associated with projects being developed by Regional Transportation District (RTD), Colorado Department of Transportation (CDOT), and Respondent. A conceptual plan and cross-section of the segment of the stormwater channel of interest, which lies on property owned by the Respondent, are illustrated on Figures 1 and 2, respectively.

The "environmental components" to be addressed by this Removal Action consist of: 1) management and handling of waste material encountered during construction of the open channel stormwater drainage feature; 2) management and, if necessary treatment and/or disposal, of dewatering liquid during construction; and 3) design and construction of an impermeable barrier system to prevent any contaminants remaining within the boundaries of the stormwater feature from adversely impacting stormwater retained within and conveyed by the open channel system, as well as prevent stormwater infiltration into contaminated media remaining within the feature.

The purpose of this RAWP is to describe 1) management and disposal solid and liquid wastes that will be encountered or generated during design and construction, 2) investigative activities that will support design of the impermeable barrier system, 3) a general approach to barrier system construction, and 4) health and safety measures to be implemented during design and construction.

1.2 Project Organization

A project Organization Chart is shown on Figure 3. Overall, the project is managed by its project coordinator, Ms. Lisa Farrell, from the City and County of Denver. Ms. Farrell represents the interests of the Respondent and is responsible to ensure that all aspects of the work described in the SOW are implemented in accordance with the AOC. She has

direct reporting responsibility to the EPA and other entities involved with the barrier system design and construction.

The Respondent has retained Engineering Management Support, Inc. (EMSI) as the Managing Contractor. All aspects of the work to be performed by the Respondent pursuant to the AOC will be under the direction and supervision of EMSI. Accordingly, EMSI will direct and supervise all aspects of the Removal Action work. To facilitate this, the Project Coordinator has authorized EMSI to communicate directly with EPA or other regulatory entities on her behalf.

As a vice-president and principal engineer of EMSI, Mr. Timothy C. Shangraw, PE., will serve as Project Manager. He has BS and MS degrees in Civil Engineering, is a registered professional engineer in Colorado, and has 32 years of professional experience, most of which has been in hazardous waste management. Since 1984, Mr. Shangraw has been involved with CERCLA activities at Colorado Superfund Sites including, but not limited to, managing design and construction Removal Actions and RD/RA/O&M of the sitewide remedy for the Lowry Landfill Superfund Site. His resume is included in Appendix A.

Key members of the project team reporting directly to Mr. Shangraw include the QA Official and Health and Safety Officer, the Technical Director, and Technical Discipline Leads. Professionals serving those roles are listed on Figure 3. Their resumes are also included in Appendix A.

Key contractors retained by EMSI consist of CTL Thompson (Geotechnical Engineer and Testing): R.K Frobel and Associates (Barrier Design Engineer); Test America (Analytical Laboratory); Aquifer Technology (Certified Asbestos Building Inspector); Aerobiology (Asbestos Analyses); Site Services Drilling, LLC (Drilling services); Waste Management of Colorado, Inc. (disposal of non-hazardous solid waste and asbestos-containing material); Clean Harbors (treatment and disposal of hazardous and industrial wastes); Foresight West Surveying, Inc. (surveying); and CADD Services (drafting and GIS services). From time to time, additional contractors may be procured to support the work. The technical work provided by these contractors is supervised by the Technical Discipline Leads, who report to the Project Manager.

The project team includes personnel with requisite certifications. The Project Manager or Health and Safety Officer will inspect certifications prior to team members working the project. Documentation of certifications will be provided in the Subcontractor files for professional certifications, and in the Project Files for OSHA certifications. Training will be provided as necessary to maintain current certifications.

Over time, the named key team individuals or contractors may change. In such an event, the Project Manager, with approval from the Project Coordinator, will replace the Team member with an equally-qualified individual or company. Should the Project Manager, QA Official, or Technical Director need to be replaced, the Project Coordinator will notify EPA and present a new candidate for review and approval by EPA.

This Removal Action is a time-critical removal action. All of the resources identified above will be assigned to the project, as necessary, to meet the critical path schedule presented on Figure 7.

1.3 Plan Organization

This RAWP contains six sections, including this introduction. A description of the Site characteristics is presented in Section 2. The Removal Action approach, including a design investigation, general layout of construction features anticipated during implementation, environmental controls, traffic patterns, and health and safety measures are presented in Section 3. A project schedule is presented in Section 4, project reporting procedures are discussed in Section 5, and references are listed in Section 6.

The text and figures are followed by six appendices that contain:

Appendix A: Resumes of Key Project Staff
Appendix B: Summary of Known Environmental Conditions
Appendix C: Sampling and Analysis Plan
Appendix D: Materials Management Plan (draft final)
Appendix E: Health and Safety Plan
Appendix F: Monthly Report Template

2 SITE CHARACTERIZATION

2.1 Waste Material

Waste material beneath and west of the Denver Coliseum parking lot have been characterized by EMSI, 2009; Brown and Caldwell, 2010; and CTL Thompson, 2011. Summary results from their investigations are presented in Appendix B.

Where the barrier system study area crosses the Coliseum parking lot (Figure 1), waste material are present from approximately two feet below the ground surface (bgs) to as much as 20 feet bgs. Additional waste material may be present in the Globeville Landing Park area located west of the parking lot, but its areal extent, thickness and depth are not known at this time.

Compounds of potential concern in waste material consist of volatile organic compounds (VOCs), polynuclear-aromatic hydrocarbons (PAHs), arsenic, lead, and asbestos. Concentrations of VOCs, PAHs and metals in the material within and adjacent to the channel alignment are posted on Figure 4. Based on available information these concentrations are not characteristically hazardous, nor TCLP toxic.

Asbestos was detected in material collected from HS-02 (Figure 3) at a concentration of 0.5 percent of the total sample analyzed (CTL Thompson, 2011). This may be considered a trace amount, but its presence raises concern that asbestos may be randomly present in the material. If encountered, the ACM may need to be handled separately.

Additional Site characterization information is necessary to support design of the barrier system, and to manage handling and disposal of material that will be disturbed. Specific objectives and details of the additional data collection are discussed in Section 3.1 of this RAWP and in Appendix C.

2.2 Groundwater

Groundwater quality along the barrier system alignment has also been characterized by EMSI, 2009; Brown and Caldwell, 2010; and CTL Thompson, 2011. Summary results from their investigations are also presented in Appendix B.

In the vicinity of the barrier system, groundwater depths were measured in 2010 (Brown and Caldwell, 2010) and 2011 (CTL-Thompson, 2011). Their single-point readings indicate depths of approximately 10.7 feet bgs at HS-02; 11.5 feet bgs at CTL MW-4; 12.6 feet bgs at CTL MW-5; 13.7 feet bgs at HS-08; 23.5 feet bgs at MW-1; 23.8 feet bgs at HS-01; and 23.9 feet bgs at CTL MW-6. These depths will likely vary over time, but the single-point data provide a general indication of the depth to groundwater for planning purposes.

As shown on Figure 5 compounds of potential concern in groundwater consist of volatile organic compounds (VOCs), arsenic, cadmium, copper, lead, manganese, and zinc. If these concentrations are representative of waters that will be encountered during barrier system construction, treatment will likely be required before the water can be released to a receiving surface water body such the South Platte River or nearby Sand Creek. Constituents that may require removal are discussed in a draft final Materials Management Plan (MMP), presented in Appendix D.

Similar to waste material, additional groundwater characterization information is necessary to support barrier system design, and to manage handling, treatment, and discharge of the groundwater encountered during construction. Objectives and details of the additional data collection are presented in in Section 3.1 of this RAWP and in Appendix C.

2.3 Soil Gas

Soil gas monitoring was conducted during the advancement of borings HS-01, HS-02, HS-08, located on Figure 5 (Brown and Caldwell, 2010). Methane concentrations ranged from 0.5 percent by volume in air (% v/v) at HS-01, to 9.8 % v/v at HS-08, to 43.4 % v/v at HS-02. Additional measurements upstream (to the southeast) of the Coliseum parking lot detected methane concentrations up to 56.7 % v/v (see Appendix B, Soil Gas). In addition, well-head gas at the ground surface was measured during advancement of the CTL-MW-series well borings. Lower Explosive Limits (LELs) of 100% were recorded at many of the well-heads (CTL-Thompson, 2011). For reference, an LEL reading of 100% equates to a methane content of approximately 5% v/v.

3 SCOPE OF REMOVAL ACTION

3.1 Design Investigation

The first phase of the Removal Action will be a Design Investigation to better characterize subsurface conditions through which the barrier system will be constructed. Specific objectives of the Design Investigation consist of:

1) Determine the areal extent and depth of waste material along the footprint of the proposed alignment;
2) Sufficiently characterize the waste material for offsite disposal. Non-hazardous, solid waste disposal at the Denver Arapahoe Disposal Site (DADS) will require a) demonstration that the material will pass RCRA characteristic screens for ignitability, corrosivity, reactivity (cyanide and sulfide screen), oxidizers, and paint filter test, and TCLP toxicity for VOCs, PAHs, lead, and arsenic. In addition, samples that might visually appear to contain asbestos will be assessed for friable asbestos;
3) Determine the potentiometric surface of groundwater beneath and adjacent to the barrier system;
4) Characterize the quality of groundwater that may be encountered during construction to determine the need for and type of treatment required during construction; and
5) Assess the methane and total VOC concentrations of soil gas that may be encountered during excavation and materials handling.

Characterization and testing procedures designed to address these Design Investigation objectives are described in a Sampling and Analysis Plan (SAP), presented in (Appendix C). Results from the Design Investigation will be presented in a Data Summary Report that will support design of the barrier system and finalization of the draft final MMP (Appendix D).

3.2 General Layout

A conceptual layout of the Removal Action is illustrated on Figure 6. Solids excavated from the drainage channel will be staged along the north side of the excavation. Drainage from the excavated material will flow back to the open excavation via a swale excavated around the north, east, and west sides of the stockpile, and via direct southward flow into the open excavation. From the open excavation, liquids will be pumped and treated, as discussed below.

Solids will be visually screened prior to placement in the stockpile for evidence of hazardous material and ACM. To the extent that either is identified, the suspect material will be staged in the same general area, but separate from the non-hazardous and non-ACM material. Testing of the potentially hazardous and/or friable ACM will be performed in accordance with the MMP.

Transport of non-hazardous solids, hazardous waste, and ACM will be performed by licensed haulers under appropriate DOT manifests. As shown on Figure 6, transport vehicles will enter the Site via McFarland Drive, turn around in the Coliseum parking lot, be loaded from the north side of the Solids Staging Area, then depart via the eastbound lane of McFarland Drive. During loading of the trucks, a Site inspector will monitor the solids for evidence of free liquids and if observed, he/she will direct the material to be placed back on the stockpile for further drainage. Similarly, a Site inspector will monitor the stockpiled solids for emissions of VOCs, methane, odor, and fugitive dust. Threshold VOC and methane levels are discussed in the Health and Safety Plan presented in Appendix E. Malodors and visible fugitive dust will be monitored by the Site inspector monitoring the work. If VOC or methane threshold levels are exceeded, the material is excessively malodorous, or visible fugitive dust is observed at the Site boundary, appropriate mitigation measures will be performed, such as spraying the material with a fine mist of water, or slowing down excavation or loading operations. These and other mitigative measures will be detailed in the Removal Action design.

Before each loaded vehicle leaves the Site, it will be inspected for evidence of free liquids leaking from the vehicle, loose material not contained within the truck trailer, and a properly positioned screen over the top of the loaded trailer. With the Site inspector's approval, the loaded transport truck will be allowed to depart the Site.

Liquids from the channel excavation will likely be generated from dewatering operations, gravity-draining of stockpiled solids, direct precipitation onto the open excavation and stockpiled soils, and decontamination activities. In accordance with the MMP any or all of these liquids may require treatment. Dewatering and water treatment details will be developed during Removal Action design. For planning purposes, treatment and pumping equipment will be located south the of the drainage channel as shown on Figure 6. Vehicle access to and from the treatment facilities will be via Arkins Court, as shown on the Figure 6.

Support areas that will accommodate a field trailer, equipment storage, and staff parking will be located along the northern boundary of the Coliseum parking lot, as shown on Figure 6. Security will be provided by fencing that surrounds working areas.

3.3 Mobilization Plan

A mobilization plan will be developed by contractors who will be implementing the Removal Action. For planning purposes, contractors will be directed to set their trailers, heavy equipment, and construction materials in the Field Trailer and Equipment Storage areas, respectively, as shown on Figure 6.

3.4 Site Preparation

A temporary on-Site field office will be established for on-Site management of Removal Action implementation. The field office will be equipped with potable bottled water, fire extinguisher, safety door, and fire and smoke detectors. Electric service will be provided from a Coliseum power supply designated by the Respondent. Distribution boxes and circuit wiring will be provided by the Respondent to meet the required power needs. All circuits throughout the Site will be protected either by a ground fault interrupter or an approved grounding system.

Lighting will be provided for all work areas when night work is required, or natural light is inadequate to perform the work safely. Work areas will be lighted to not less than the minimum illumination intensities listed in OSHA Standard 29 CFR 1910.120.

The Respondent will provide access to an adequate water supply for construction water. Non-potable water outlets will be clearly identified so as not to be used for drinking or cooking purposes. Water for suppression of VOCs, odor, or dust, and for soil moisture will be supplied by the Respondent at locations indicated during Removal Action design. Potable water such as bottled drinking water for use by Contractor's employees will be provided by the Contractor.

Contractors will provide temporary toilet facilities, which will be the chemical type, insofar as possible, to minimize water requirements. Contractors will be responsible for servicing and maintaining these facilities.

All vehicular traffic control will conform to the traffic patterns illustrated on Figure 6 and be in conformance with Site Rules (discussed below) to promote safe and efficient operations. Parking areas will be designated by the On-Site Manager. Site Rules are as follows:

- Maximum speed limit for all vehicles/equipment on-Site is 15 miles per hour.
- Vehicle and pedestrian traffic must yield to heavy equipment at all times.
- Contractor's vehicles must have orange survey flagging wrapped around interior rear view mirror to distinguish them as Superfund Site activity-related vehicle traffic.
- No vehicle will be allowed to idle for more than 5 minutes (Title II – Revised Municipal Code, Chapter 4, Article IV, Sec 4-43) unless it is required to perform a specific construction function.

Equipment storage will be in the Equipment Storage Area shown on Figure 6. Storage will be in accordance with the individual Contractor's Work Plans, as approved by the Respondent.

3.5 Excavation of Solids

An excavation plan will be developed as part of the Removal Action design.

3.6 Solids Treatment Prior to Disposal

Visual screening, segregation, and additional testing (if needed) of solids are addressed in the MMP.

3.7 Solids Disposal

Solids disposal options are addressed in the MMP.

3.8 Groundwater Management

If groundwater, which includes perched water within the excavated material, is encountered the excavation will require dewatering. Two management scenarios are considered in the MMP. The first is treatment followed by release to the South Platte River or Sand Creek under Colorado's Construction Dewatering (CDW) general permit or Remediation permit. The second is disposal of the water offsite as an industrial or hazardous waste in a licensed RCRA treatment, storage, or disposal facility (TSDF).

At completion of the Removal Action, a permanent groundwater monitoring well will be installed at a location that meets data quality objectives that will be determined in consultation with EPA.

3.9 Stormwater Management

A stormwater control plan will be developed as part of Removal Action design. It will include measures used to divert stormwater around the open excavation, solids storage area, and water treatment areas. Diversions may consist of diversion terraces or interceptor channels that route stormwater to the South Platte River with minimal erosion impact. To the extent that the diverted stormwater may contain suspended solids contributed from Removal Action activities, the diverted water will be treated using Best Management Practices (BMPs) prior to release to the South Platte River. Such BMPs may consist of sediment barriers such as hay/straw bales or silt fencing composed of geotextile.

Stormwater that contacts waste material will require collection and possible treatment prior to release. Collection mechanisms, treatment, and release will be developed as part of the Removal Action design. Release of the water to the South Platte River or Sand Creek will require a discharge permit, as discussed in the MMP.

3.10 Dust Control Measures

Dust control measures will be developed as part of the Removal Action design.

3.11 Personnel and Equipment Monitoring and Decontamination

Contractors and subcontractors performing work at the Site will decontaminate all tools, heavy equipment, and other equipment prior to arrival on-Site. Tools and heavy equipment that are used on-Site that contact waste material or contaminated groundwater will be pressure-washed until visually-clean, prior to departing from the Site. Trucks transporting waste material or contaminated groundwater from the Site will not require pre-Site decontamination, nor departure decontamination unless the Site inspector observes visual contamination on trucks entering the Site, or Site materials on vehicle tires or transport equipment exiting the Site.

Decontamination of personnel will occur as necessary prior to leaving the Site. Visibly-stained personal protective equipment (PPE) will be collected and disposed as a non-hazardous solid waste unless there is reason to believe the PPE is hazardous or is contaminated with ACM.

3.12 Worker Health and Safety

Hazardous levels of VOCs and explosive gases may be present during drilling, excavation, materials handling, or when working near an open excavation or stockpiled material. Applicable regulations include, but may not be limited to, the confined space standard (Part 1926.21(b)(6)(i) and (ii) in Subpart C); gases, vapors, fumes, dusts and mists (Part 1926.55 in Part 1926 Subpart E); fire protection and prevention (Part 1926 Subpart F); and trenching and excavation (Part 1926 Subpart P). Site-specific threshold values, mitigation measures, PPE, and recommended personnel field procedures are presented in the Project Health and Safety Plan (HASP), which is presented in Appendix E.

At a minimum, contractors and subcontractors will abide by a HASP for their employees. A contractor or subcontractor may choose to apply the Project HASP as a guide to develop its own HASP, or may choose to adopt the Project HASP in full. In either case, the Project HASP will be considered the primary HASP for all project-related activities. If another HASP is provided by a contractor or subcontractor, it will be considered an attachment to the Project HASP. All contractors and subcontractors will, at a minimum, follow all provisions of the Project HASP and/or applicable OSHA guidelines; whichever is more stringent or appropriate. In addition, all organizations performing oversight will be responsible for their own employee's health and safety and for providing and verifying that each person present at the Site has the appropriate health and safety training.

3.13 Procurement Strategy

A procurement strategy will be developed as part of Removal Action design.

4 PROJECT SCHEDULE

A Master Schedule is presented on Figure 7.

Project plans consisting of this RAWP, the SAP (including the Field Sampling Plan, Quality Assurance Project Plan, and Records Management Plan), MMP, and HASP are scheduled to be prepared during the months of May and June, and finalized in early July, 2015. The Design Investigation field work is scheduled for July. Laboratory analyses and geotechnical testing will occur during July and August followed by preparation of a draft Data Summary Report and Preliminary Removal Action Design. The latter two documents are scheduled to be completed in mid-September, 2015. Finalization of the Data Summary Report, MMP, and Design documents will occur between October and December, 2015.

Procurement of material suppliers and contractors is scheduled between December, 2015 and late February, 2016. Contracts will be awarded in early March 2016, followed by mobilization, setup, and application for a Construction Dewatering and/or Remediation Permits between March and April 2016. Removal Action construction is scheduled to commence in May and be completed in November, 2016.

5 PROJECT REPORTING

5.1 Monthly Progress Reporting

Monthly progress reports will contain most of the information specified in Superfund Removal Procedures, Removal Response Reporting: POLREP and OSC Reports (EPA, 1994). The monthly report will include the following sections:

Section 1 - Heading
Section 2 - Background,
Section 3 - Site Information,
Section 4 - Removal Information, and
Section 5 - Disposition of Wastes.

Section 1 will include date of report, Site name, author of report, recipient of report, and number of report.

Section 2 will the Site number, response authority, CERCLIS number, NPL status, Action Memorandum date, actual start date, demobilization date, and completion date.

Section 3 will include incident category (e.g., time critical, fund-lead, etc.), description of the Site, description of the threat, and removal Site investigation results.

Section 4 will include a description of contamination, cleanup standards, actions to date, and planned actions.

Section 5 will include a description of the waste, treatment process required prior to disposal, volume of treated waste, temporary storage, and final disposition of the waste.

The template included as Appendix F will be followed for the monthly reports. Monthly reports will be submitted to EPA no later than 30 calendar days after the end of the reporting period.

5.2 Construction Completion Report

At completion of the Removal Action, a Construction Completion Report (CCR) will be prepared. It will include the following 10 sections:

Section 1 - Introduction: Include a brief description of the location, size, environmental setting, and operational history of the Site. Describe the operations and waste management practices that contributed to contamination of the Site. Describe the major findings and results of Site investigation activities.

Section 2 - Operable Unit Background: Summarize requirements specified in the ROD, ESD, and TCRA Memorandum for OU2. Include information on the cleanup goals, institutional controls, monitoring requirements, and other parameters applicable to the design, construction, operation, and performance of the removal action.

Section 3 - Construction Activities: Provide a step-by-step summary description of the activities undertaken to construct and implement the remedy e.g., mobilization and Site preparatory work; construction of the treatment system; associated Site work, such as fencing and surface water collection and control; system operation and monitoring; and sampling activities).

Section 4 - Chronology of Events: Include significant milestones and dates, such as, design submittal and approval; ROD amendments or ESDs; mobilization and construction of the remedy; significant operational events such as treatment system/application start-up, monitoring and sampling events, system modifications, operational down time, variances or non-compliance situations, and final shut-down or cessation of operations; final sampling and confirmation-of- performance results; required inspections; demobilization; and completion or startup of post- construction operation & maintenance activities.

Section 5 - Performance Standards and Construction Quality Control: Describe the overall performance of the technology in terms of comparison to cleanup goals. For treatment remedies, identify the quantity of material treated, the strategy used for collecting and analyzing samples, and the overall results from the sampling and analysis effort.

Section 6 - Final Inspection and Certifications: Report the results of the various inspections to include the pre-Final inspection, and identify noted deficiencies. If implemented, summarize details of the institutional controls (e.g., the type of institutional control, who will maintain the control, who will enforce the control).

Section 7 - Summary of Project Costs: Provide the actual final costs and applicable year for the project. If actual costs are not available, provide estimated costs.

Section 8 - Observations and Lessons Learned: Provide Site-specific observations and lessons learned from the project, highlighting successes and problems encountered and how resolved.

Section 9 - Operable Unit Contact Information: Provide contact information (names, addresses, phone numbers, and contract/reference data) for the major design and remediation contractors, EPA oversight contractors, and the respective RPM and project managers for EPA, the State, and the Respondent, as applicable.

6 REFERENCES

CTL Thompson, Inc., 2011. Limited Phase II Environmental Site Assessment, 40th Street Outfall, South Platte River to Blake Street, Denver, CO, prepared for WHPacific, Inc. May 10, 2011.

Brown and Caldwell, 2010. High Street Limited Subsurface Investigation, prepared for City and County of Denver. May 28, 2010.

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EPA, 1994 (June). Superfund Removal Procedures, Removal Response Reporting: POL.REP and OSC Reports. Office of Solid Waste and Emergency Response (OSWER) Directive 9360-3-03, United States Environmental Protection Agency, Washington, D.C. 20460

FIGURES

Sanitary Sewer

Drainage Channel

Option 2 - High Street Outfall Alignment

LEGEND

Option 2 - High Street Outfall Alignment

Drainage Channel Sampling Area

SS Sanitary Sewer

N

170 0 170

SCALE IN FEET

Figure 1

CONCEPTUAL PLAN VIEW OF STORMWATER DRAINAGE SYSTEM

OPERABLE UNIT #2, VB I70 SUPERFUND SITE

EMSI Engineering Management Support, Inc.

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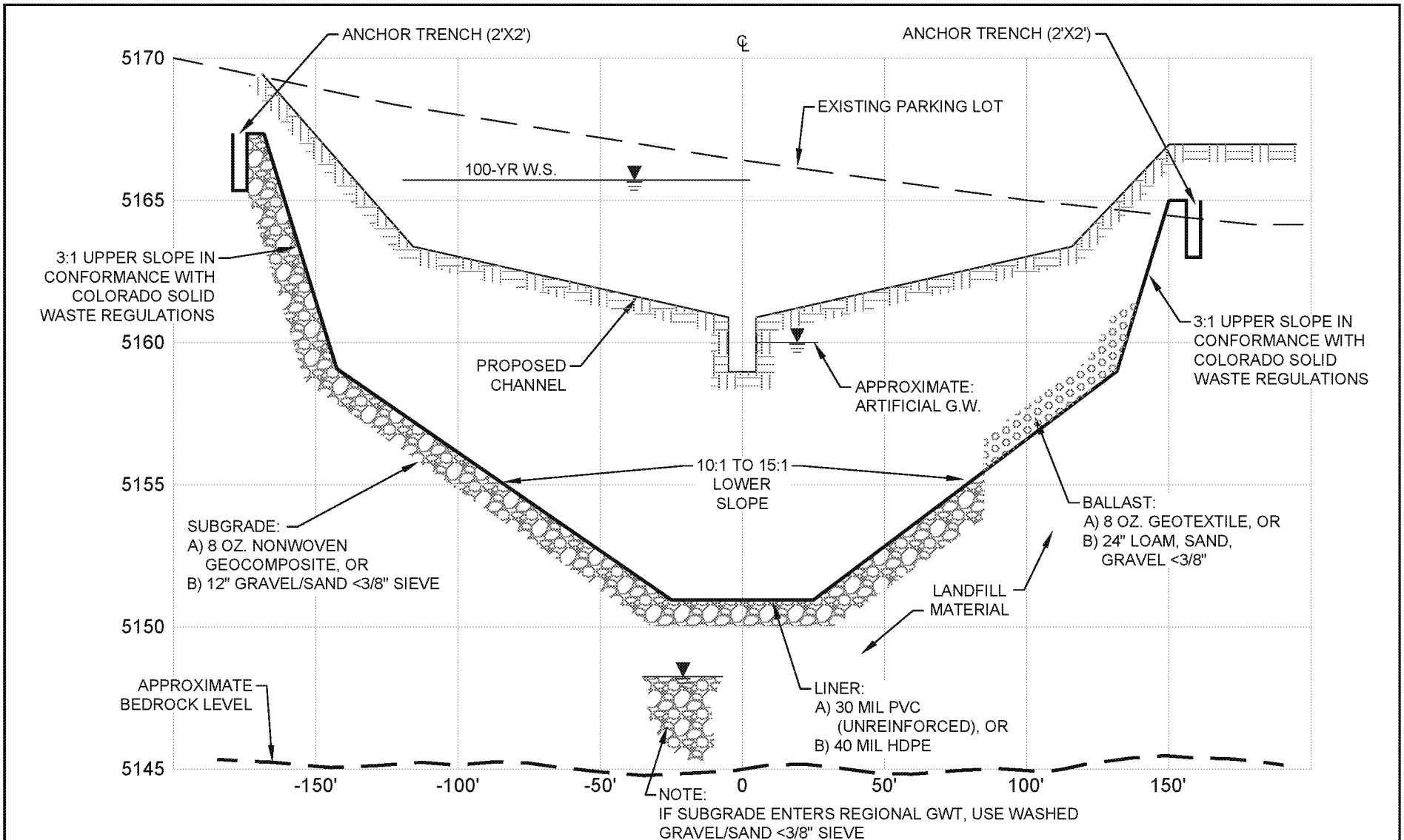


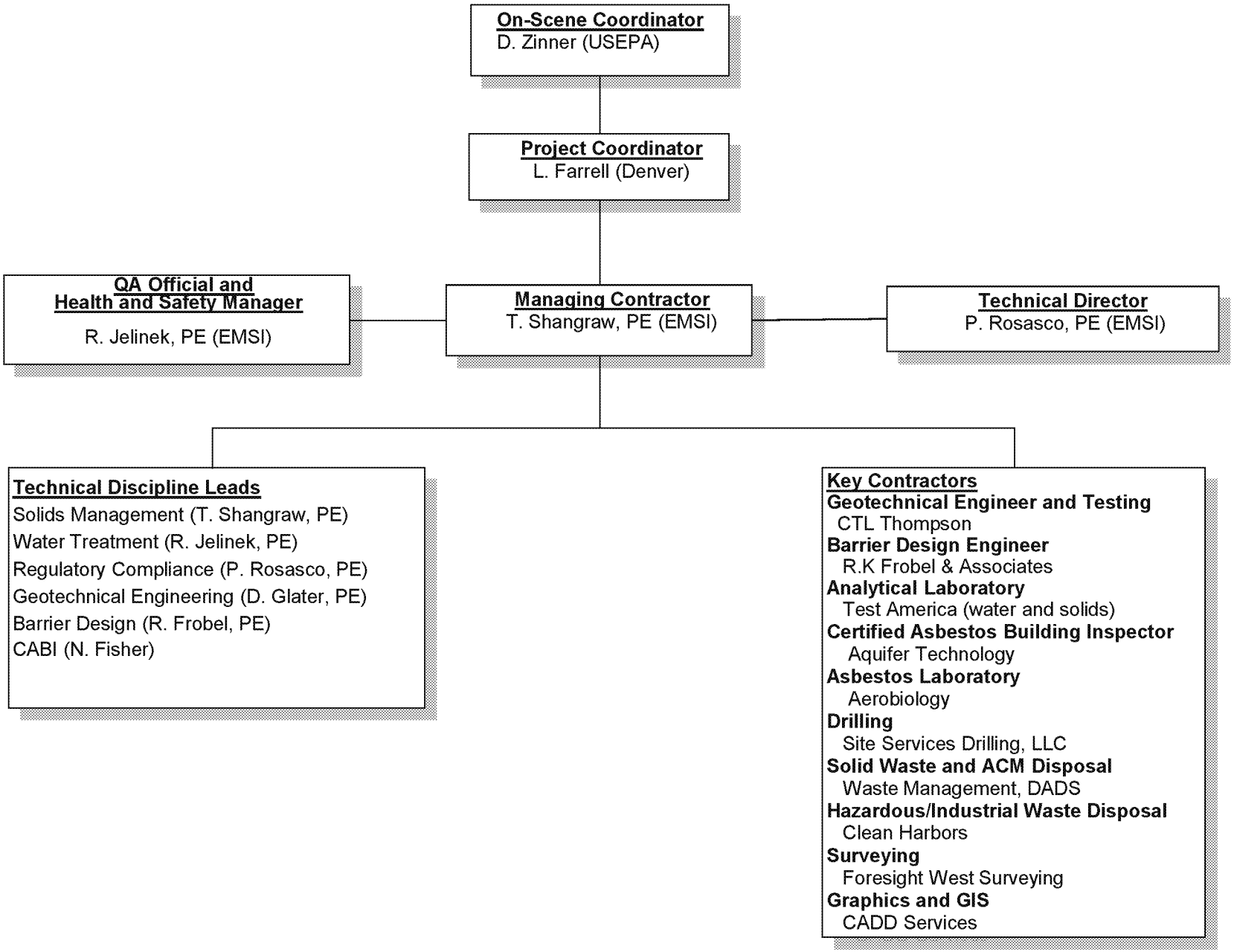
Figure 2

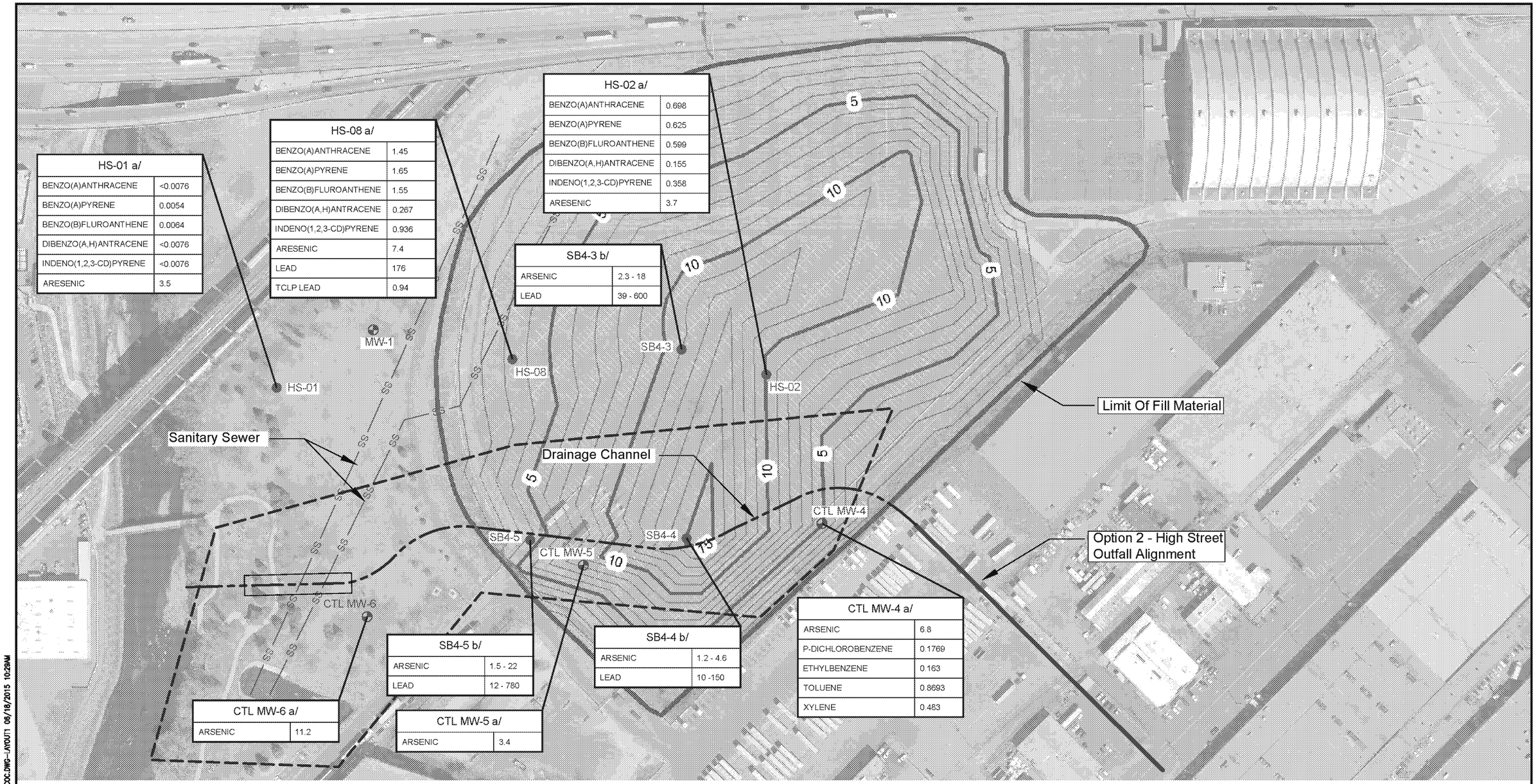
CONCEPTUAL STORMWATER CHANNEL CROSS-SECTION

OPERABLE UNIT #2, VB I70 SUPERFUND SITE

EMSI Engineering Management Support, Inc.

Figure 3
Organizational Structure
VB/I70 Operable Unit #2 Response Action





LEGEND

- Monitoring Well
- Soil Boring
- Limits of Fill Material Within the Coliseum Parking Area as Defined During the OU2 Remedial Investigation (EMSI, 2009)
- 5ft / 1ft — Thickness of Fill Material Based on EMSI 2009 Remedial Investigation
- Option 2 - High Street Outfall Alignment
- Drainage Channel Sampling Area
- SS — Sanitary Sewer

Note: Results presented in milligrams per kilogram (mg/kg).
TCLP results presented in milligrams per liter (mg/L)
a/ CTL Thompson, 2011
b/ EMSI, 2009

N

170 0 170

SCALE IN FEET

Figure 4

WASTE MATERIAL
COMPOUNDS OF CONCERN

OPERABLE UNIT #2, VB I70 SUPERFUND SITE

EMSI Engineering Management Support, Inc.

M:\CLIENTS\EMSI\VB-I70\2015\FIG4-LANDFILL SOIL MAT-COC.DWG-LAYOUT1 06/18/2015 10:29AM

MW-1 a/	
TOTAL ARSENIC	2.0 - 2.2
DISSOLVED ARSENIC	2.0 - 2.3
TOTAL CADMIUM	0.24 - 15.4
DISSOLVED CADMIUM	0.2 - 0.25
TOTAL COPPER	2.8 - 3.2
DISSOLVED COPPER	2.7 - 3.7
TOTAL LEAD	0.25 - 0.55
DISSOLVED LEAD	0 - 0.14
DISSOLVED MANGANESE	2140
TOTAL ZINC	14 - 19
DISSOLVED ZINC	12 - 14
TETRACHLOROETHYLENE	1 - 24.8
TRICHLOROETHYLENE	<2.0 - 5.8
CHLOROFORM	1.1 - 3.1

HS-08 b/	
CHLOROFORM	<2.0
TETRACHLOROETHYLENE	<2.0
TRICHLOROETHYLENE	<2.0
CADMIUM	<10

HS-02 b/	
CHLOROFORM	1.1
TETRACHLOROETHYLENE	1.0
TRICHLOROETHYLENE	<2.0
CADMIUM	<10

HS-01 b/	
CHLOROFORM	<2.0
TETRACHLOROETHYLENE	24.8
TRICHLOROETHYLENE	5.8
CADMIUM	<10

CTL MW-4 b/	
TETRACHLOROETHYLENE	1.2
CIS-1,2-DICHLOROETHENE	0.46
XLYLENE	0.75
TOTAL ARSENIC	15.4
DISSOLVED MANGANESE	2140

MW-6 b/	
TOTAL ARSENIC	57.3
DISSOLVED IRON	1000
DISSOLVED MANGANESE	3320
TETRACHLOROETHYLENE	26.3
TRICHLOROETHYLENE	10.0
CIS-1,2 DICHLORETHENE	0.39
XYLENE	0.71

CTL MW-5 b/	
TOTAL ARSENIC	8.5
DISSOLVED IRON	23300
DISSOLVED MANGANESE	775
HEXAVALENT CHROMIUM	<50

MW-1
HS-08
HS-02
HS-01
CTL MW-4
CTL MW-5
CTL MW-6

Limit Of Fill Material
Sanitary Sewer
Drainage Channel
Option 2 - High Street Outfall Alignment

LEGEND

- Monitoring Well
- Soil Boring
- Limits of Fill Material Within the Coliseum Parking Area as Defined During the OU2 Remedial Investigation (EMSI, 2009)
- 5ft / 1ft — Thickness of Fill Material Based on EMSI 2009 Remedial Investigation
- Option 2 - High Street Outfall Alignment
- Drainage Channel Sampling Area
- SS — Sanitary Sewer

Note: Results presented in micrograms per liter (ug/L).
a/ EMSI, 2009
b/ CTL Thompson, 2011

N

170 0 170
SCALE IN FEET

Figure 5

GROUNDWATER
COMPOUNDS OF CONCERN

OPERABLE UNIT #2, VB I70 SUPERFUND SITE

EMSI Engineering Management Support, Inc.

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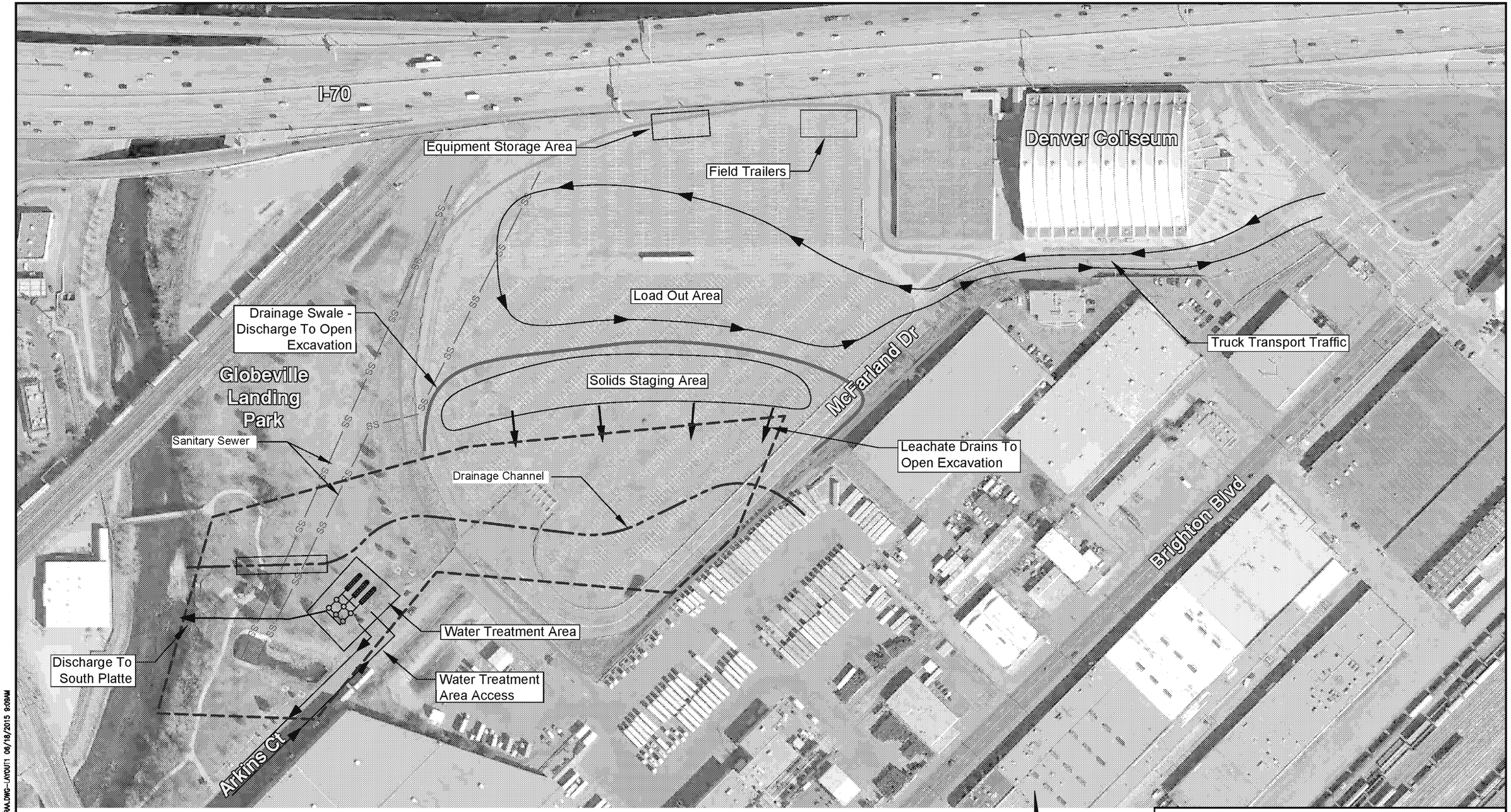

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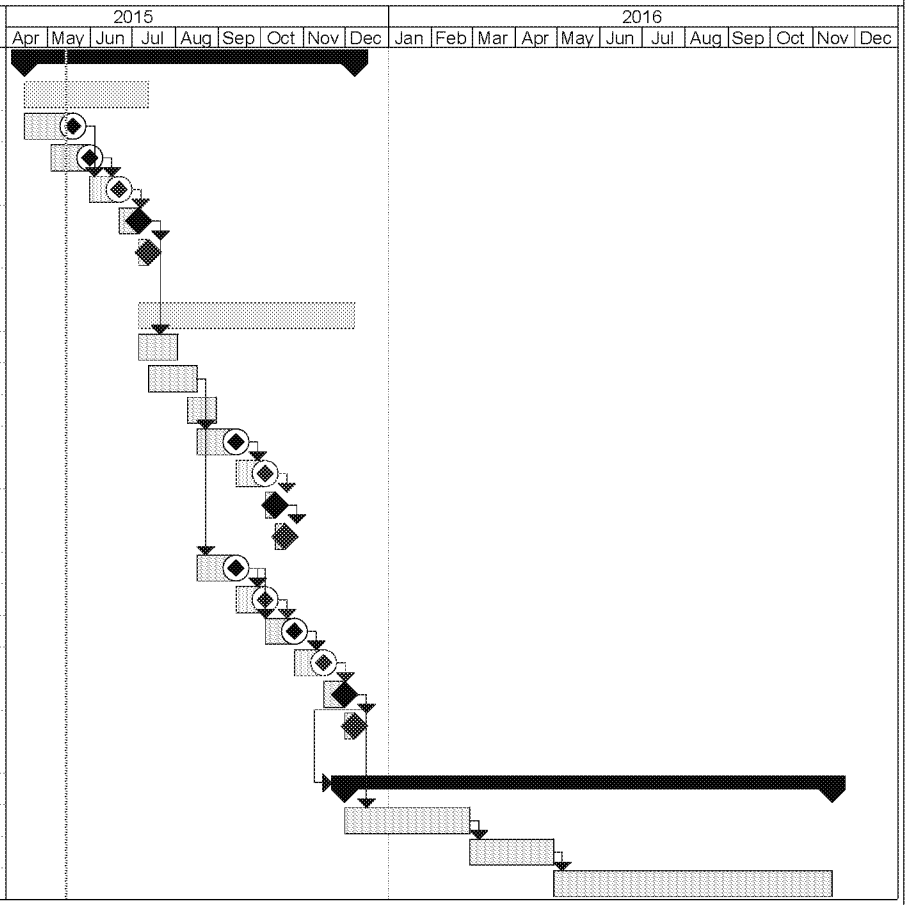
Figure 6

REMOVAL ACTION
CONCEPT PLAN
OPERABLE UNIT #2, VB I70 SUPERFUND SITE

EMSI Engineering Management Support, Inc.

Figure 7
Removal Action Master Schedule
VB/I70 Operable Unit #2

ID	Task Name	Duration	Start	Finish
1	**Planning and Design**	**169 days**	**Wed 4/15/15**	**Tue 12/8/15**
2	Project Plans	89 edays	Wed 4/15/15	Mon 7/13/15
3	Draft SOW and MMP	35 edays	Wed 4/15/15	Wed 5/20/15
4	Draft RAWP, SAP, and HASP	28 edays	Mon 5/4/15	Mon 6/1/15
5	Agency Review of Draft Plans	21 edays	Mon 6/1/15	Mon 6/22/15
6	Finalize SOW, RAWP, SAP, and HASP	14 edays	Mon 6/22/15	Mon 7/6/15
7	Agency Review and Approval of Planning Docs	7 edays	Mon 7/6/15	Mon 7/13/15
8				
9	Design	155 edays	Mon 7/6/15	Tue 12/8/15
10	Design Investigation	28 edays	Mon 7/6/15	Mon 8/3/15
11	Lab Analytical and Geotechnical Testing	35 edays	Mon 7/13/15	Mon 8/17/15
12	Data Validation	21 edays	Mon 8/10/15	Mon 8/31/15
13	Draft Data Summary Report and Final MMP	28 edays	Mon 8/17/15	Mon 9/14/15
14	Agency Review of Draft DSR and Final MMP	21 edays	Mon 9/14/15	Mon 10/5/15
15	Finalize DSR	7 edays	Mon 10/5/15	Mon 10/12/15
16	Agency Review and Approval of DSR and MMP	7 edays	Mon 10/12/15	Mon 10/19/15
17	Preliminary Design (50%)	28 edays	Mon 8/17/15	Mon 9/14/15
18	Agency Review of Preliminary Design	21 edays	Mon 9/14/15	Mon 10/5/15
19	Pre-Final Design (95%)	21 edays	Mon 10/5/15	Mon 10/26/15
20	Agency Review of Pre-Final Design	21 edays	Mon 10/26/15	Mon 11/16/15
21	Final Design	15 edays	Mon 11/16/15	Tue 12/1/15
22	Agency Review and Approval of Final Design	7 edays	Tue 12/1/15	Tue 12/8/15
23				
24	**Procurement and Construction**	**250 days**	**Tue 12/1/15**	**Tue 11/15/16**
25	Procurement	90 edays	Tue 12/1/15	Mon 2/29/16
26	Mobilization, Setup, Permitting, Initial Dewatering	60 edays	Mon 2/29/16	Fri 4/29/16
27	Excavation and Liner Installation	200 edays	Fri 4/29/16	Tue 11/15/16



Task
Split
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Split
Rolled Up Milestone
Rolled Up Progress
External Tasks
Project Summary
External Milestone
External Milestone
Deadline

Appendix A

Resumes

TIMOTHY C. SHANGRAW, P.E.

Mr. Shangraw has over 34 years of technical and management experience relevant to hazardous waste site investigations and remediation, water and wastewater treatment, mine dewatering, stormwater planning, and environmental studies. His expertise is particularly strong in managing complex remediation programs from conceptual design through detailed design, construction, and operations.

For the past 20 years, Mr. Shangraw has managed remedial design, remedial action, and O&M of the Lowry Landfill Superfund Site near Denver, Colorado. This has been a $100M+ project involving groundwater cutoff walls, pump and treatment systems, capping, waste pit remediation, landfill gas collection and treatment, and extensive environmental monitoring. Unique challenges included development and application of emerging technologies to oxidize and biodegrade 1,4-dioxane and other organic compounds and to sequester inorganic compounds. Such technologies involved both *in-situ* and above-ground treatment methods. Case studies were published in technical journals and/or presented to national technology-transfer organizations.

Throughout his career, Mr. Shangraw has managed and technically directed regulatory closures for Superfund, RCRA, TSCA, and radioactive mixed-waste sites for Fortune 500 companies throughout the United States, for DOD sites, and for US DOE sites. He has also assisted clients with estimating present and future environmental liabilities for current assets and pending acquisitions and divestitures.

EDUCATION

M.S., Civil/Environmental Engineering, University of Colorado, Boulder, 1979
B.S., Civil Engineering, University of Massachusetts, Dartmouth, 1977

REGISTRATION

Registered Professional Engineer (Colorado, 1981, No. 19853)
DOE "Q" Clearance (retired)

EMPLOYMENT HISTORY

1998-Present Engineering Management Support, Inc.
Vice President and Principal Engineer

1984-1998 PARSONS Corporation. Denver, Colorado
Senior Associate and Program Manager. Directed, managed, and performed hazardous waste studies, design, and construction projects from the Denver, Salt Lake City, and Richland, Washington offices. Projects included restoration programs under RCRA and CERCLA for industry, PRP groups, Department of Defense, and Department of Energy. Also assessed potential hydrogeologic impacts from water storage and supply projects in the Denver metro area.

1983-1984 Law Engineering Testing Company. Englewood, Colorado
Project Engineer. Performed RCRA compliance studies for wood preserving sites throughout the United States. Conducted field investigations, prepared landfill siting studies, and designed lagoon closures. Also prepared drainage reports for land development projects utilizing HEC-2 flood plain model.

1980-1983 D'Appolonia Consulting Engineers. Englewood, Colorado.
Staff Engineer. Conducted remedial evaluations of abandoned mine reclamation sites, prepared environmental baseline studies for coal gasification plants and underground mines, and participated in cleanup of a Superfund Site in Philadelphia, Pennsylvania. Also participated in geotechnical studies for surface water impoundments and mine subsidence evaluations.

1979-1980 Cyprus Mines Corporation - Hansen Project, Canon City, Colorado.
Staff Engineer/Hydrologist. Responsible for design of dewatering systems for a large open pit uranium mine. Performed aquifer tests, supervised computer modeling studies, and integrated dewatering system into mine development plans. Also provided conceptual designs for treatment of radioactive mine water.

MEMBERSHIPS

Willowbrook Water and Sanitation District – Director
Water Environment Federation

PUBLICATIONS AND PRESENTATIONS

T.C. Shangraw, W. Plaehn, S. Richtel, D. Bollmann, 2003. "Biological Treatment Option for 1,4-Dioxane in Landfill Leachate." Presented at the 9th Symposium in the Series on Groundwater Contaminants for the California Groundwater Resources Association, San Jose, California, December 10.

W.A. Plaehn, T.C. Shangraw, M.F. Steiner, M. Murphy, L.T. Tagawa, and D.D Bollmann. 2000. "Case Study in the Constructability Testing and Operation of an Ex-Situ Soil Treatment Cell." Presented at the Second International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterey, California. May 22-25.

W.A. Plaehn, P.R. Guest, T.C. Shangraw, K.A.Friesen, L.T.Tagawa, and D.D. Bollmann. 1998. "ROD Amendment for On-Site Treatment of Hazardous Waste Pit Materials." Presented at the 14th Annual Conference on Contaminated Soils, University of Massachusetts at Amherst. October 19-22.

Yu, J.K., C. Stoltz, T.C. Shangraw, M. Stofford, and G.A. Jones. 1990. "Surface Water and Ground Water TCE Interactions of Air Force Installations at Foothills, Denver Basin, Colorado and Suisan - Fairfield Basin, California." Presented at the Annual Meeting of the Association of Ground Water Scientists and Engineers, NWWA, Anaheim, California, September 25-27.

Hicks, J.R., T.M. Murphy, L.A. Korner, T.C. Shangraw, and J.K. Yu. 1990. "Hydrogeologic Characterization Supporting a Ground Water Contaminant Pathway Evaluation at Air Force Plant PJKS, Waterton, Colorado." Presented at Groundwater Engineering and Management Conference, Denver, Colorado, February 28-March 1.

Shangraw, T.C., T.S. Mustard, and D.P. Michaud. 1988. "Remote Detection of Ground Water Contamination Using Soil Gas Surveys." Presented at the AICHE Summer National Meeting. Denver, Colorado, August 21-24.

Shangraw, T.C., D. P. Michaud, T.M. Murphy, and J.K Yu. 1988. "Verification of the Utility of a Photovac Gas Chromatograph for Conduct of Soil Gas Surveys." Second National Outdoor Action Conference, NWWA, Las Vegas, Nevada, May 23-26.

Shangraw, T.C. 1987. "Application of Soil Gas Surveys for Remote Detection of Ground Water Contamination." Presented at the AWWA/WPCA Clean Water Conference, Denver, Colorado, May.

PAUL V. ROSASCO, P.E.

Mr. Rosasco has over 38 years of experience in providing supervision, management, and technical review for geological, hydrogeological, and engineering projects. He has designed and implemented geological, hydrogeological and geophysical investigations and environmental monitoring programs for sites ranging from 0.5 acres to over 300 square miles. Mr. Rosasco has extensive project management and technical experience in a wide variety of waste disposal and environmental contamination projects. He has provided design, site engineering, and construction management services and acted as owner's representative for surface and subsurface remediation projects. He has also been involved in a variety of geotechnical, geologic hazard, and water supply evaluation projects.

Mr. Rosasco has 32 years of experience with all aspects of CERCLA and National Priorities List (NPL) site projects where he has worked at over 40 Superfund Sites. His experience includes evaluation of existing data and development of scopes of work, negotiation of scopes of work, administrative orders and consent decrees, implementation and supervision of remedial investigations, feasibility studies, remedial designs, remedial actions, removal actions and performance and effectiveness evaluations of operation and maintenance of removal and remedial actions.

Mr. Rosasco also has 30 years of experience with Resource Conservation and Recovery Act (RCRA) facilities where he has performed characterizations of generator, treatment, storage, disposal sites, assessed the nature and extent of contamination, and evaluated and designed corrective measures. He has participated in the development and review of RCRA Part B applications, ground-water monitoring and corrective measure programs and closure plans. Mr. Rosasco has also developed operations plans and designed and facilitated permitting for solid and liquid waste disposal sites.

Mr. Rosasco has provided expert testimony related to groundwater occurrence, flow and chemical transport, the nature, extent and sources of environmental contamination, the necessity and appropriateness of various remedial actions, consistency of response actions with the National Contingency Plan (NCP) and other environmental regulations, and allocation of response costs. He has been qualified by several federal courts as an expert in the areas of hydrogeology, contaminant occurrence, fate and transport, remedial actions, cost allocation and NCP consistency. He has also provided expert testimony on the role of environmental issues and site remediation related to property valuation and condemnation proceedings. He has testified at numerous regulatory hearings and public meetings on issues ranging from site selection and the design and operations of waste disposal facilities, environmental contamination and remediation, and water quality standards. He has had his deposition taken 38 times, testified at trial 13 times and at formal administrative or agency hearings seven times. He has also provided expert assistance related to construction claims and disputes.

In addition to expert testimony, Mr. Rosasco has provided expert assistance in support of litigation in a wide variety matters including hydrogeological characterization, nature, extent and causation of contamination, and remedial actions at regional groundwater contamination sites such as the San Gabriel Valley – Baldwin Park Operable Unit, the Suburban Operable Unit and

the former Fairchild Industries facility in southern California, and the former Lockheed facility in Redlands, CA; regional mining districts including Leadville, CO, Bunker Hill, ID, Crede, CO, and Jamestown CA; petroleum refineries, bulk plants, and retail outlets; and various manufacturing and commercial facilities throughout the country. Mr. Rosasco served as an independent arbiter during settlement negotiations for a leaking underground storage tank site in Colorado and served as the 30-B6 representative relative to the claimed releases from adits, tunnels and portals in the upper portion of the Coeur d'Alene Basin.

EDUCATION

M.E., Engineering Geology, Colorado School of Mines, 1985
B.S., Geology, University of Oregon, 1976

REGISTRATIONS

Registered Professional Engineer in Colorado, Washington, and Illinois (retired status)

EMPLOYMENT HISTORY

1994 – Present	Engineering Management Support Inc. President and Principal Engineer
1985 - 1994	Harding Lawson Associates Member of Board of Directors Senior Vice President Director of Program Development Consulting Vice President Director of RCRA and CERCLA Services Northeast Regional Manager Mid-continent Operating Officer Rocky Mountain Regional Manager Principal in Charge - Denver Office Associate in Charge - Denver Office
1981 - 1985:	Fox Consultants, Inc. Hydrogeology group manager Project geological engineer and Rock mechanics supervisor
1979 - 1981:	Department of Energy/Office of Nuclear Waste Isolation, Colorado School of Mines Project geologist and Assistant project manager

1978 - 1979: Colorado School of Mines
Research assistant

1977 - 1978: Kennicott Copper Co./Bear Creek Mining Co.
Assistant geologist

1976 - 1977 Lane County Community College
Mathematics Instructor

COMMUNITY SERVICE

Former Member - Jefferson County, Colorado Planning Commission (member and former Chairman [twice] and Vice-Chairman [twice] 1994 - 2004)

AFFILIATIONS AND MEMBERSHIPS

American Society of Civil Engineers
Association of Groundwater Scientist and Engineers

PUBLICATIONS

1995 Weaver, Jeffrey, D., Digel, Robert, K., and Rosasco, Paul V., Performance of a Post-audit of Groundwater Flow Models Used in Design of a Groundwater Capture/Containment System, in Symposium on Subsurface Fluid Flow (Ground-Water) Model, American Society for Testing and Materials.

1985 Rosasco, Paul, V., Geometric Continuity of Structural Discontinuities, CSM-ONWI Test Site, Idaho Springs, Colorado. Masters of Engineering report, Colorado School of Mines, Golden, Colorado.

1984 Rosasco, Paul, V. and Curry, John, A Cooperative Agreement to Investigate and Remedy Chemical Contamination at the Boulder/Marshall Landfills, Colorado. Prepared for the 5th National Conference on Management of Uncontrolled Hazardous Waste Sites.

ROBERT T. JELINEK, P.E.

Mr. Jelinek has over 34 years of experience specializing in engineering alternatives evaluations, cost estimating, and designs for groundwater and soil remediation and water/wastewater treatment systems projects. He has been involved both in technical and managerial positions on a wide range of engineering projects. Mr. Jelinek formerly managed the corporate-wide Remedial Design Center for a major consulting firm. In this role, he provided oversite, design review, value engineering review, and quality control (QC) review of all remedial design projects world-wide. In addition, he served as a lead author for their Design Procedures Manual and prepared the company's standard technical specifications and standard drawings.

Mr. Jelinek has prepared CERCLA feasibility studies (FS) and Engineering Evaluation/Cost Analyses (EE/CAs) as well as RCRA corrective measures studies (CMS). He has prepared engineering design evaluations; remedial action plans; drawings and specifications for construction of remedial actions and removal actions as well as water and wastewater treatment facilities for industrial and municipal application; construction quality assurance plans; facilities plans; construction cost estimates, and scheduling. He is also experienced in bench- and pilot-scale treatability studies, water and sewer utility rate studies, plans of operation, operation and maintenance (O&M) manuals, industrial pretreatment evaluations and program development, sewer use ordinances, water quality evaluations, and infiltration/inflow analyses.

Mr. Jelinek has conducted process, civil, and mechanical design and design review for metals and other inorganics, VOC, semivolatile organic compound (SVOC), and radionuclide removal, as well as side-stream and sludge treatment facilities at industrial, military, and municipal sites. He has experience at 40 hazardous waste sites and on 24 industrial or municipal water/wastewater-related projects and has provided regulatory interface, management of multiple-client relationships, project management, engineering services during construction at both contaminated and uncontaminated sites, and onsite inspection/construction management.

EDUCATION

M.S., Environmental Engineering, University of Colorado - Boulder, 1979
B.S., Civil Engineering, Lehigh University, Pennsylvania, 1978

REGISTRATIONS

Registered Professional Engineer in Colorado, Texas, New Jersey, New York, Pennsylvania, and Illinois

EMPLOYMENT HISTORY

1996-Present — Engineering Management Support, Inc.
Vice President and Principal Engineer

1989-1996 — Harding Lawson Associates
Vice President
Manager of the corporate-wide remedial design center and chief engineer.
Responsible for preparation and QC review of all drawings and specifications

for construction of ground water and soil remedies at contaminated sites. Also preparation of O&M manuals. Responsible for coordination of designs of three internal Remedial Construction Divisions.

Principal Engineer

Project manager for large remedial action projects. Deputy Program Manager for $40M of remedial investigation, endangerment assessment, feasibility study, remedial design, and remedial action programs at the Rocky Mountain Arsenal. Company-wide resource for remedy conceptualization and implementation.

Associate Engineer

Manager of engineering group. Prepared CERCLA feasibility studies and RCRA Corrective Measures Studies, bench and pilot-scale hazardous waste treatability studies, and remedial designs. Project Manager for several design and design/build projects. Also provided engineering services during construction.

1983-1989 Project Manager, Richard P. Arber Associates, Inc.

Managed industrial and municipal water and wastewater conveyance, treatment and residuals disposal engineering projects, including facility audits, evaluations, design, and engineering services during construction under the CWA. Designed water and wastewater treatment, distribution, and storage facilities. Also served as Town Engineer.

1980-1983 Project Engineer, Henningson, Durham & Richardson (HDR)

Prepared drawings and specifications for construction of expansions to numerous municipal wastewater treatment facilities in Colorado and Wyoming under the CWA. Also developed industrial pretreatment programs and prepared utility rate studies.

1978-1979 Research Associate, Union Carbide Corporation

Operated pilot-scale ion exchange tertiary treatment systems for conversion of municipal wastewater to potable water (through the University of Colorado at Boulder).

1974-1978 Field Engineer, Stearns & Wheler Engineers

Conducted several sanitary and combined sewer system infiltration/inflow and sewer system evaluation surveys. Prepared 201 Facilities Plans under the Clean Water Act.

AFFILIATIONS AND MEMBERSHIPS

American Water Works Association

Water Environment Federation (formerly Water Pollution Control Federation), Rocky Mountain Section (Colorado, New Mexico, and Wyoming)-President, 1990-91

PUBLICATIONS AND PRESENTATIONS

1994. Field optimization of groundwater extraction and recharge: Design reevaluation during system construction and startup, Rocky Mountain Arsenal. Presented at the National

Groundwater Association Forum on Remediation of Groundwater Contamination, February 2.

1993. Groundwater treatment plant design under CERCLA versus the Record of Decision design concept: The paradox. Poster presentation at the Hazardous Materials Control Research Institute SUPERFUND Conference, November 30.

1993. Evaluation of soil vapor extraction for mass removal of organic and odor-causing compounds and characterization of odorants by tandem mass spectrometry in Basin F solids, Rocky Mountain Arsenal. In *proceedings* of Hazardous Materials Control Research Institute SUPERFUND Conference, November 30.

1991. Development of optimal processes and operational procedures for treatment of hydrazine wastewater. In *proceedings* of and presented at the Hazardous Materials Control Research Institute, Research and Development conference, February 22.

1990. Selecting a chemical oxidation/ultraviolet treatment system and successful treatment of hydrazine wastewater at Rocky Mountain Arsenal. In *proceedings* of and presented at the Hazardous Materials Control Research Institute SUPERFUND conference, November 28.

1990. UV/Chemical Oxidation of Hydrazine Wastewater at the Rocky Mountain Arsenal. Presented at the Hazardous Waste Treatment Technologies and Applications Seminar to the Rocky Mountain Water Pollution Control Association and American Water Works Association.

1989. Uranium removal from drinking water using a small full-scale system. U.S. EPA Risk Reduction Engineering Laboratory Research and Development Report, EPA/600/52-89/012.

1988. Operating a small full-scale ion exchange system for uranium removal. *Journal of American Water Works Association*, vol. 80, no. 7.

1987. Radioactivity in drinking water. Presented to Colorado Water Quality Analysts Association.

1987. Occurrence and treatment of uranium in point of use systems in Colorado. In *Radon and Groundwater*, edited by Barbara Graves, Lewis Publishers (with others).

1987. Operation of small-scale uranium removal systems. In *proceedings* of and presented at the American Water Works Association annual conference, Kansas City, Missouri, June.

Resume

David A. Glater, P.E., C.P.G.

Principal Engineer

Mr. Glater has over 30 years of experience in geological engineering. He joined CTL | Thompson, Inc. in 1997 and currently serves as a Principal Engineer based in our Denver branch office. He is responsible for client service, project engineering, technical review, and the supervision of staff professionals related to geotechnical and geological engineering studies. Mr. Glater's expertise in engineering and staff supervision includes small to large buildings, parks and recreational structures, infrastructure, planned residential developments, commercial and industrial developments and mines. His career encompasses diverse skills in engineering, staff management, and project management.

Mr. Glater's knowledge and background includes work on deep, drilled pier foundations, geotechnical hazards, engineered fills, soil improvement, construction material recycling, pavements and floor slabs on expansive soils, and soil-related structure damage forensics. He has also been published in several industry publications and served as president for the Colorado Association of Geotechnical Engineers.

EDUCATION

B.S., Geological Engineering
Colorado School of Mines, 1977

PROFESSIONAL REGISTRATION

Registered Professional Engineer
Colorado No. 20204

Registered Professional Engineer
Kansas No.18321

Registered Professional Geologist
Wyoming No. 3508

PROFESSIONAL SOCIETIES

American Society of Civil Engineers

Association of Engineering Geologists

American Institute of Professional Geologists,
C.P.G. No. 6583

Colorado Association of Geotechnical Engineers, Past President

PROJECT EXPERIENCE

Fortune Dam, Arvada, Colorado
Geological Engineer

6th Avenue West Estates, Jefferson County, Colorado
Project Manager and Geological Engineer

Castle Pines North, Douglas County, Colorado
Project Manager

Castlewood Ranch Subdivision, Castle Rock, Colorado
Project Manager

University of Colorado Williams Village Bear Creek Apartments, Boulder, Colorado
Project Manager

The Canyons South, Douglas County, Colorado
Project Manager

RONALD K. FROBEL, MSCE, P.E.

CIVIL ENGINEERING
GEOSYNTHETICS
EXPERT WITNESS
FORENSICS

FIRM: R. K. FROBEL & ASSOCIATES
Consulting Civil / Geosynthetics Engineers

TITLE: Principal and Owner

PROFESSIONAL AFFILIATIONS:

American Society for Testing and Materials (ASTM) -
Founding member of Committee D 35 on Geosynthetics
Chairman ASTM D35 Subcommittee on Geomembranes 1985-2000
ASTM Award of Merit Recipient/ASTM Fellow - 1992
ASTM D18 Soil and Rock - Special Service Award - 2000
Transportation Research Board (TRB) of The National Academies
Appointed Member A2K07 Geosynthetics 2000 - 2003
National Society of Professional Engineers (NSPE) - Member
American Society of Civil Engineers (ASCE) - Member
Colorado Section - ASCE - Member
International Society of Soil Mechanics and Foundation Engineers
(ISSMFE) - Member
International Geosynthetics Society (IGS) - Member
North American Geosynthetics Society (NAGS) - Member
International Standards Organization (ISO) - Member TC 221
Team Leader - USA Delegation Geosynthetics 1985 - 2001
European Committee for Standardization (CEN) - USA Observer
EPA Advisory Committee on Geosynthetics (Past Member)
Association of State Dam Safety Officials (ASDSO) – Member
U. S. Committee on Irrigation and Drainage (USCID) - Member
Technical Advisory Committee - Geosynthetics Magazine
Editorial Board - Geotextiles and Geomembranes Journal
Editorial Board - Geotechnical Testing Journal (ASTM)
Co-Chairman International Conference on Geomembranes
Co-Chairman ASTM Symposium on Impermeable Barriers
U.S. Naval Reserve Officer (Inactive)
Registered Professional Engineer – Civil (Colorado)
Mine Safety Health Administration (MSHA) Certified

ACADEMIC BACKGROUND:

University of Arizona: M.S. - Civil Engineering - 1975
University of Arizona: B. S. - Civil Engineering - 1969
Wentworth Institute of Technology: A.S. Architecture – 1966

PROFESSIONAL EXPERIENCE:

R. K. Frobel & Associates - Consulting Engineers
Evergreen, Colorado, Principal and Owner, 1988 - Present

Chemie Linz AG and Polyfelt Ges.m.b.H., Linz, Austria
U. S. Technical Manager Geosynthetics, 1985 - 1988

U.S. Bureau of Reclamation, Engineering and Research Center
Denver, Colorado, Technical Specialist in Construction Materials Research and Application, 1978 - 1985

Water Resources Research Center (WRRC), University of Arizona
Tucson, AZ, Associate Research Engineer, 1975 - 1978

Engineering Experiment Station, University of Arizona
Tucson, AZ, Research Assistant, 1974 - 1975

United States Navy, Commissioned Naval Officer, 1970 - 1973

REPRESENTATIVE EXPERIENCE:

R.K. Frobel & Associates: Civil engineering firm specializing in the fields of geotechnical, geoenvironmental and geosynthetics. Expertise is provided to full service civil/geotechnical engineering firms, federal agencies, municipalities or owners on a direct contract, joint venture or sub-consultant basis. Responsibilities are primarily devoted to specialized technical assistance in design and application for foreign and domestic projects such as the following: Forensics investigations into geotechnical and geosynthetics failures; providing expert report and testimony on failure analysis; providing design and peer review on landfill lining and cover system design, mine waste reclamation, water treatment facilities, hydro-technical canal, dam, reservoir and mining projects, floating reservoir covers; oil and gas waste containment; design of manufacturers technical literature and manuals; development and presentation of technical seminars; new product development and testing; MQA/CQA program design and implementation.

Polyfelt Ges.m.b.H., Linz, Austria and Denver Colorado: As U.S. technical manager, primary responsibilities included technical development for the Polyfelt line of geosynthetics for the U.S. civil engineering market as well as world wide applications.

U.S. Bureau of Reclamation, Denver, Colorado: As technical specialist, responsibilities included directing laboratory research, design and development investigations into geosynthetics and construction materials for use on large western water projects such as dams, canals, power plants and other civil structures. Included were material research, selection and testing, specification writing, large scale pilot test programs, MQA/CQA program design and supervision of site installations. Prime author or contributor to several USBR technical publications incorporating geosynthetics.

University of Arizona, Tucson, Arizona: As research engineer at the Water Resources Research Center, responsibilities included research, design and development of engineering materials and methods for use in construction of major water projects including potable water reservoirs, canals and distribution systems. Prime author or contributor to several WRRC technical publications.

Northeast Utilities, Hartford, Connecticut: As field engineer for construction at Northeast Utilities, responsibilities included liason for many construction projects including additions to power plants, construction of substations, erection of fuel oil pipe lines and fuel oil storage tanks. Responsibilities also included detailed review, inspection and reporting on numerous construction projects.

U.S. Navy: Commissioned Naval Officer – Nuclear Program

PUBLICATIONS: Over 85 published articles, papers and books.

CONTACT DETAILS:

Ronald K. Frobel, MSCE, P.E.
R. K. Frobel & Associates
Consulting Civil/Geosynthetics Engineers
32156 Castle Court
Suite 211/M240
Evergreen, Colorado 80439 USA
Ph 303-679-0285
M 720-289-0300
Email: geosynthetics@msn.com

NICK FISCHER

PROFESSIONAL EXPERIENCE

AQUIFER TECHNOLOGY
Environmental Engineer
Denver, CO/Clovis, NM

- Designing remediation systems including construction supervision, overseeing equipment installation and startup, and conducting the operation and maintenance of those systems.
- Conducting asbestos and mold surveys.
- Completing quarterly reports for PRPs, impacted property owners, legal counsel, and state/federal agencies.
- Industrial plant operator for treatment facilities in Colorado.
- Completed acid mine drainage and waste stabilization studies for the Bureau of Reclamation.
- Providing emergency response oversight for highway spills, collecting soil / groundwater samples, and providing cleanup documentation to CDOT and CDPHE.
- Conducting Phase I and II ESAs.
- Oversight of underground storage tank (UST) removals and cleanups.

HIGGINS AND ASSOCIATES, LLC
Environmental Denver, CO

- Project manager for oil and gas remediation facilities.
- Performed Phase I & II ESAs, UST removals / investigations / remediation, and asbestos surveys.
- Developed Corrective Action Plans, Voluntary Cleanup Action Plans, Spill Prevention Control and Countermeasure (SPCC) Plans.

TERRACON
Environmental Engineer
Denver, CO

- Performed Phase I & II ESAs, UST removals, Risk Management Plans, and site investigations and remediation.

TEXAS EMPLOYERS INSURANCE ASSOCIATION
Safety Engineer
Denver, CO

- Performed safety inspections at industrial facilities and construction sites.

EDUCATION/CERTIFICATIONS

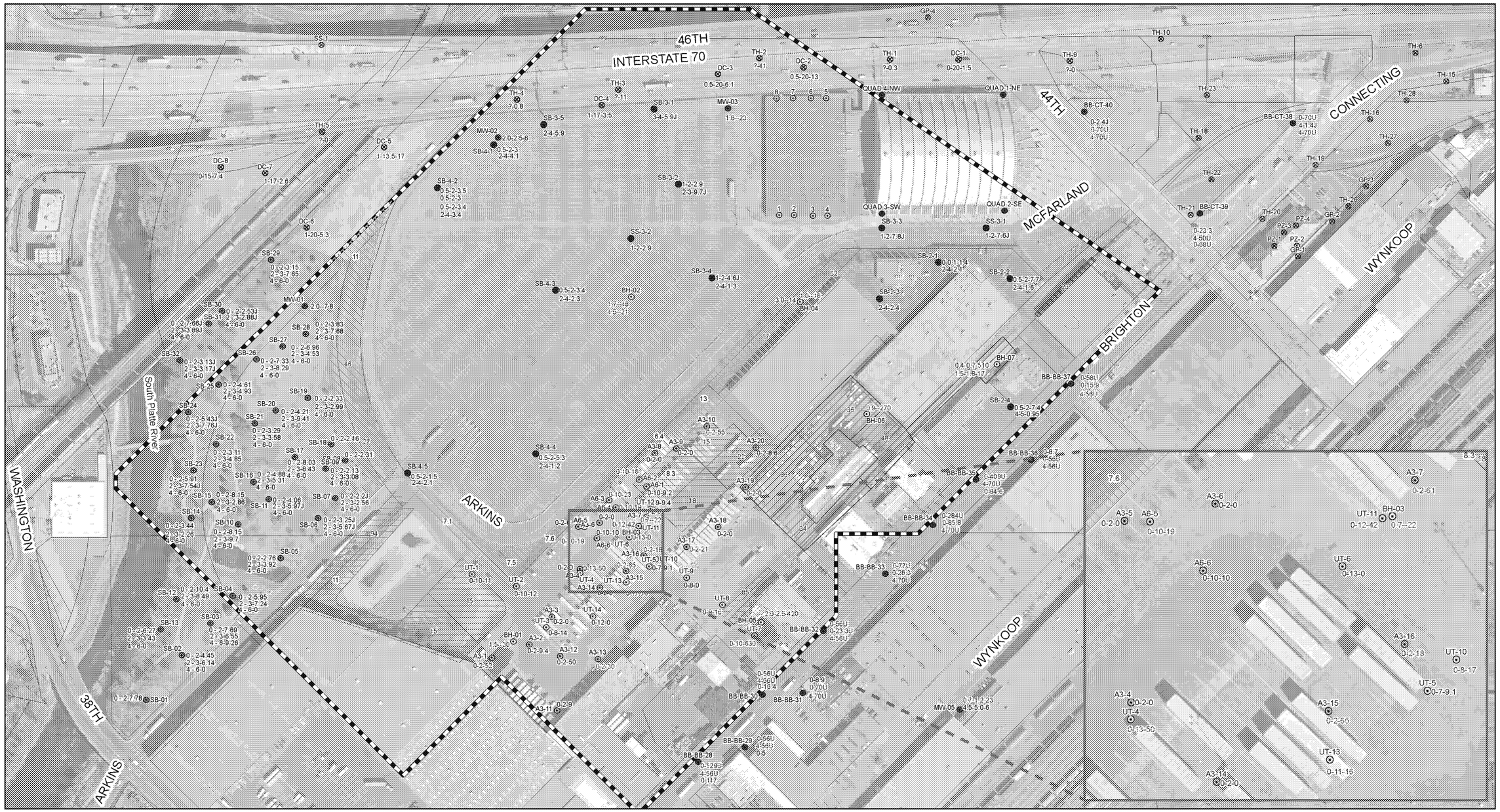
B.S. Chemical Engineering, New Mexico State University
Environmental Masters Courses CSU, UCD
OPS Registered Consultant # 5419
Senior Corrosion Technologist, NACE #3682
EPA-Approved AHERA Asbestos Building Inspector and Colorado State Certification
Industrial Plant Operator "A" 1960
Water Plant Operator "C" # 3030
Waste Water Plant Operator "D" # 7437
OSHA Hazardous Operations Training (both 40-hour and 8-hour refreshers)
Health Care Provider

Appendix B

Summary of Known Environmental Conditions

- Waste Material
- Groundwater
- Soil Gas

WASTE MATERIAL



Legend

- 2008 Drilling
- Barn Samples
- Pepsi Area 3 Soil Samples
- Pepsi Area 5 Soil Samples
- Pepsi Area 6 Soil Samples
- BB-BB-xx Holes
- BH Soil Samples
- MW Holes
- QUAD Samples
- SB Soil Samples
- CDOT Holes
- Pepsi UT (Utility Trenches) Soil Locations

Areal Soil Samples with Addresses

- Parking Restrictor
- 3801 Brighton Blvd
- 4301 Brighton Blvd
- 4375 Brighton Blvd
- 4600 Humbolt

As concentrations exceeding 15 ppm background limit (red)

Depth (ft) - Concentration (ppm)

0 125 250 500
Feet

1 inch = 250 feet

N

Figure 10

Arsenic Soil Sample Concentrations 0 to 5 feet

VB/I-70 Remedial Investigation

EMSI Engineering Support Management, Inc.

Legend

- 2008 Drilling
- Barn Samples
- Pepsi Area 3 Soil Samples
- Pepsi Area 5 Soil Samples
- Pepsi Area 6 Soil Samples
- BB-BB-xx Holes
- BH Soil Samples
- MW Holes
- QUAD Samples
- SB Soil Samples
- CDOT Holes
- Pepsi UT (Utility Trenches) Soil Locations

As concentrations exceeding 15 ppm background limit (red)

Depth (ft) - Concentration (ppm)

0 125 250 500
Feet

1 inch = 250 feet

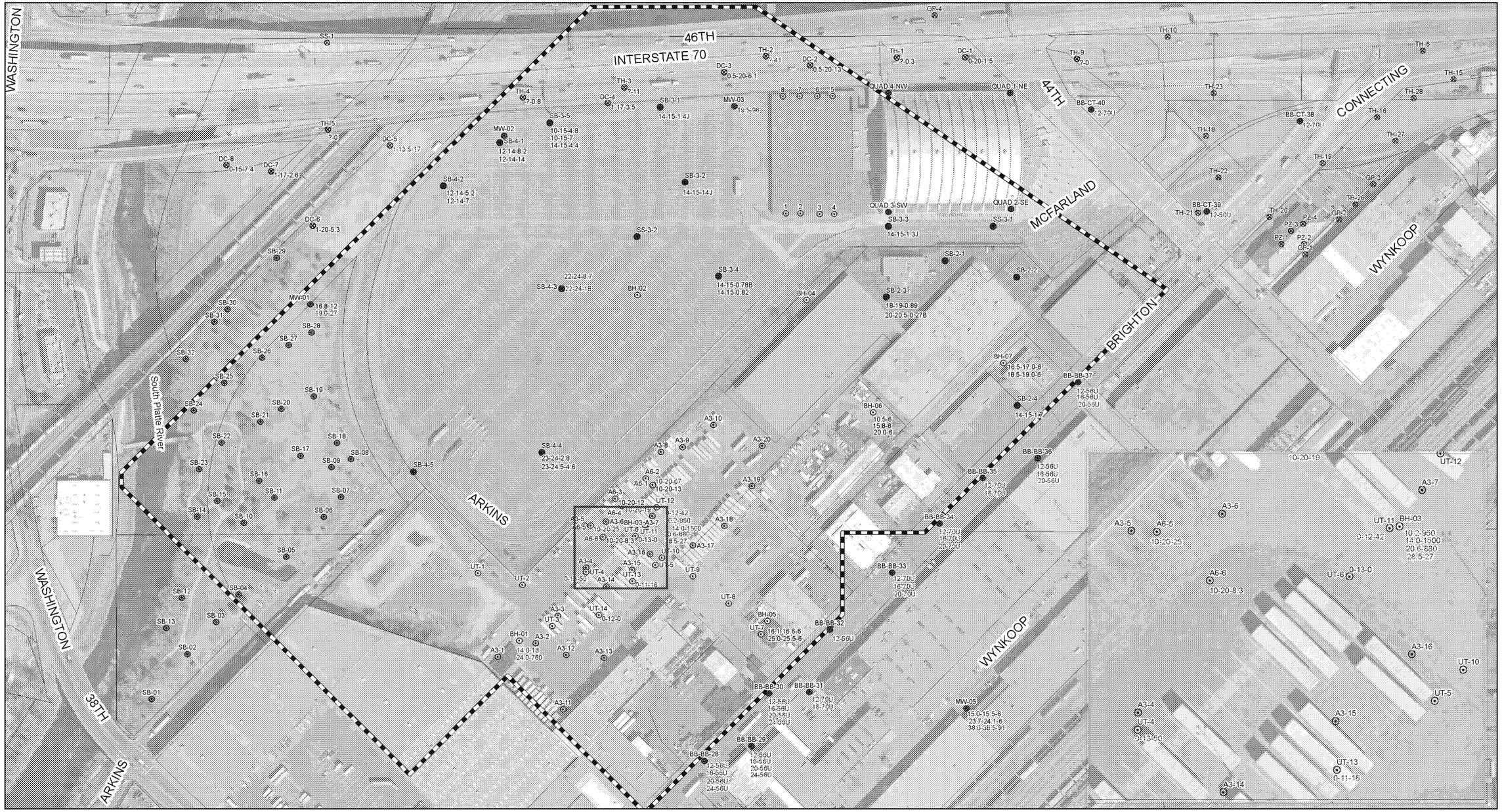
N

Figure 12

Arsenic Soil Sample Concentrations 5 to 10 feet

VB/I-70 Remedial Investigation

EMSI Engineering Support Management, Inc.



Legend

- 2008 Drilling
- Barn Samples
- Pepsi Area 3 Soil Samples
- Pepsi Area 5 Soil Samples
- Pepsi Area 6 Soil Samples
- BB-BB-xx Holes
- BH Soil Samples
- MW Holes
- QUAD Samples
- SB Soil Samples
- CDOT Holes
- Pepsi UT (Utility Trenches) Soil Locations

As concentrations exceeding 15 ppm background limit (red)

Depth (ft) - Concentration (ppm)

0 125 250 500
Feet

1 inch = 250 feet

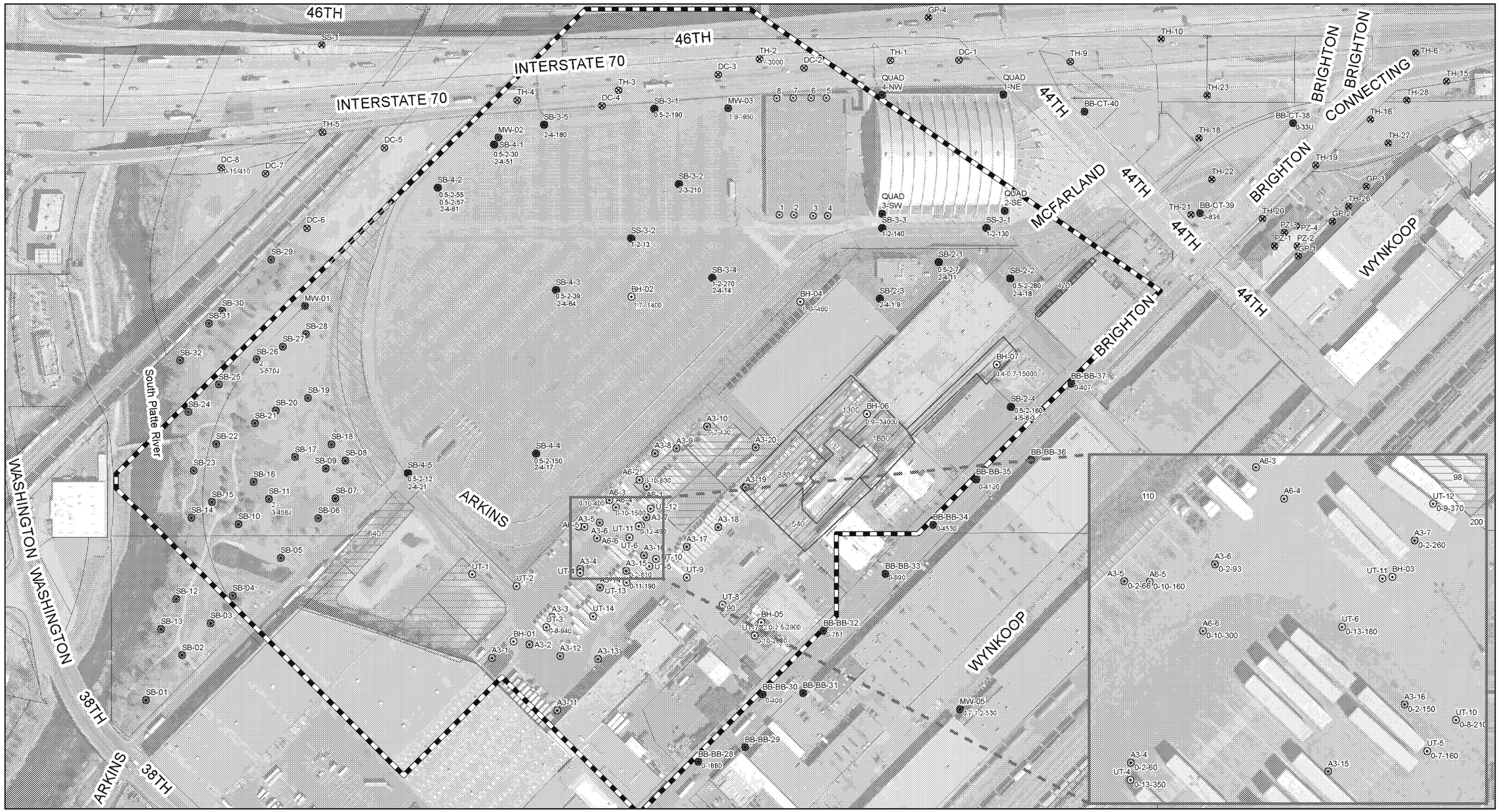
N

Figure 13

Arsenic Soil Sample Concentrations 10 feet and Greater Depth

VB/I-70 Remedial Investigation

EMSI Engineering Support Management, Inc.



Legend

- 2008 Drilling
- Barn Samples
- Pepsi Area 3 Soil Samples
- Pepsi Area 5 Soil Samples
- Pepsi Area 6 Soil Samples
- BB-BB-xx Holes
- BH Soil Samples
- MW Holes
- QUAD Samples
- SB Soil Samples
- CDOT Holes
- Pepsi UT (Utility Trenches) Soil Locations

Areal Soil Samples with Addresses

- Parking Restrictor
- 3801 Brighton Blvd
- 4301 Brighton Blvd
- 4375 Brighton Blvd
- 4600 Humbolt

Pb concentrations exceeding 400 ppm background limit (red)

Depth (ft) - Concentration (ppm)

0 125 250 500
Feet

1 inch = 250 feet

N

Figure 11

Lead Soil Sample Concentrations 0 to 5 feet

VB/I-70 Remedial Investigation

EM SI Engineering Support Management, Inc.

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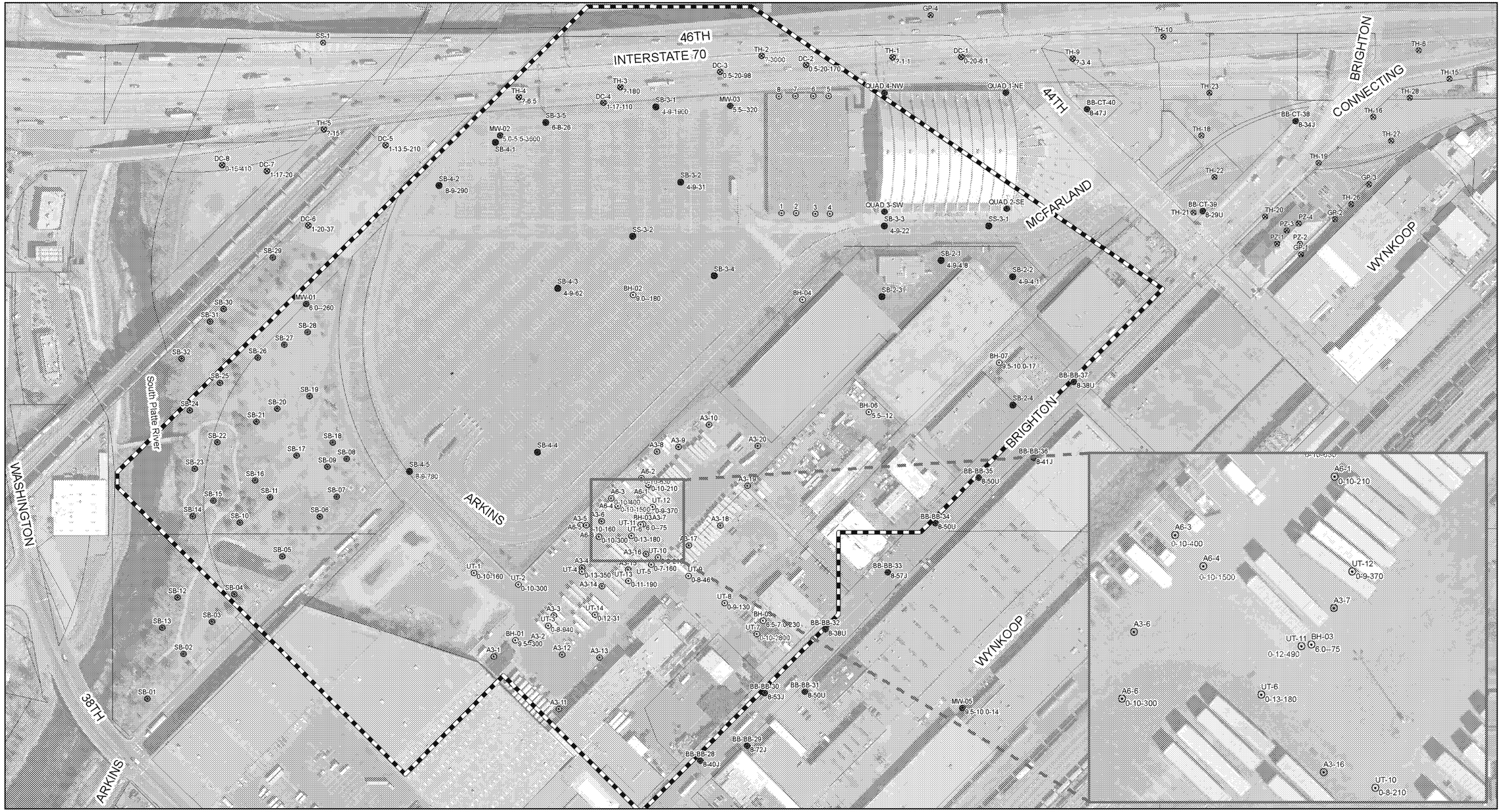


Legend

- 2008 Drilling
- Barn Samples
- Pepsi Area 3 Soil Samples
- Pepsi Area 5 Soil Samples
- Pepsi Area 6 Soil Samples
- BB-BB-xx Holes
- BH Soil Samples
- MW Holes
- QUAD Samples
- SB Soil Samples
- CDOT Holes
- Pepsi UT (Utility Trenches) Soil Locations

Pb concentrations exceeding 400 ppm background limit (red)

Depth (ft) - Concentration (ppm)

0 125 250 500
Feet

1 inch = 250 feet

N

Figure 14

Lead Soil Sample Concentrations 5 to 10 feet

VB/I-70 Remedial Investigation

EMSI Engineering Support Management, Inc.

Legend

- 2008 Drilling
- Barn Samples
- Pepsi Area 3 Soil Samples
- Pepsi Area 5 Soil Samples
- Pepsi Area 6 Soil Samples
- BB-BB-xx Holes
- BH Soil Samples
- MW Holes
- QUAD Samples
- SB Soil Samples
- CDOT Holes
- Pepsi UT (Utility Trenches) Soil Locations

Pb concentrations exceeding 400 ppm background limit (red)

Depth (ft) - Concentration (ppm)

0 62.5 125 250 375 500

Feet

1 inch = 250 feet

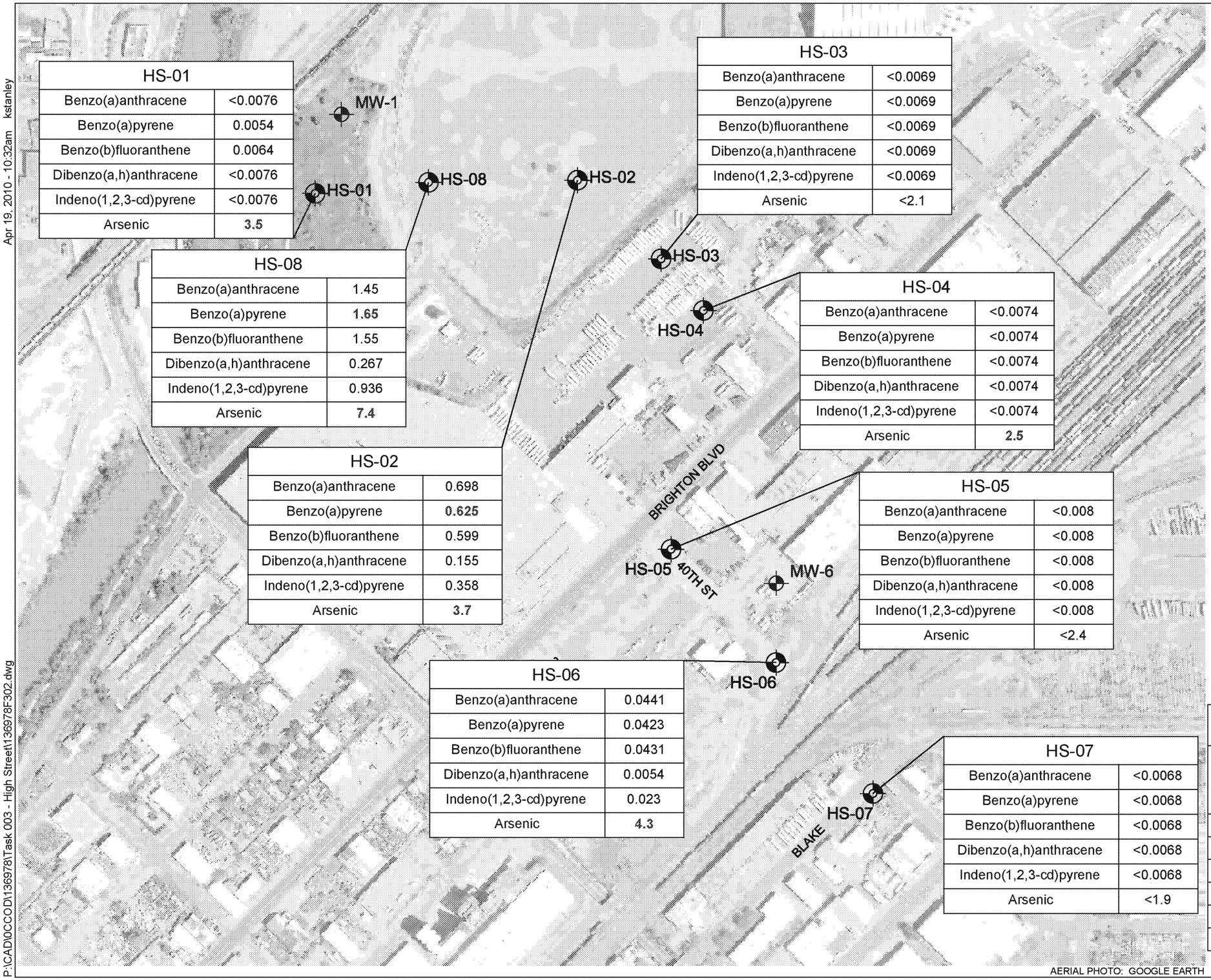
N

Figure 15

Lead Soil Sample Concentrations 10 feet and Greater Depth

VB/I-70 Remedial Investigation

EMSI Engineering Support Management, Inc.



HS-01	
Benzo(a)anthracene	<0.0076
Benzo(a)pyrene	0.0054
Benzo(b)fluoranthene	0.0064
Dibenzo(a,h)anthracene	<0.0076
Indeno(1,2,3-cd)pyrene	<0.0076
Arsenic	**3.5**

HS-03	
Benzo(a)anthracene	<0.0069
Benzo(a)pyrene	<0.0069
Benzo(b)fluoranthene	<0.0069
Dibenzo(a,h)anthracene	<0.0069
Indeno(1,2,3-cd)pyrene	<0.0069
Arsenic	<2.1

HS-08	
Benzo(a)anthracene	1.45
Benzo(a)pyrene	**1.65**
Benzo(b)fluoranthene	1.55
Dibenzo(a,h)anthracene	0.267
Indeno(1,2,3-cd)pyrene	0.936
Arsenic	**7.4**

HS-04	
Benzo(a)anthracene	<0.0074
Benzo(a)pyrene	<0.0074
Benzo(b)fluoranthene	<0.0074
Dibenzo(a,h)anthracene	<0.0074
Indeno(1,2,3-cd)pyrene	<0.0074
Arsenic	**2.5**

HS-02	
Benzo(a)anthracene	0.698
Benzo(a)pyrene	**0.625**
Benzo(b)fluoranthene	0.599
Dibenzo(a,h)anthracene	0.155
Indeno(1,2,3-cd)pyrene	0.358
Arsenic	**3.7**

HS-05	
Benzo(a)anthracene	<0.008
Benzo(a)pyrene	<0.008
Benzo(b)fluoranthene	<0.008
Dibenzo(a,h)anthracene	<0.008
Indeno(1,2,3-cd)pyrene	<0.008
Arsenic	<2.4

HS-06	
Benzo(a)anthracene	0.0441
Benzo(a)pyrene	0.0423
Benzo(b)fluoranthene	0.0431
Dibenzo(a,h)anthracene	0.0054
Indeno(1,2,3-cd)pyrene	0.023
Arsenic	**4.3**

HS-07	
Benzo(a)anthracene	<0.0068
Benzo(a)pyrene	<0.0068
Benzo(b)fluoranthene	<0.0068
Dibenzo(a,h)anthracene	<0.0068
Indeno(1,2,3-cd)pyrene	<0.0068
Arsenic	<1.9

0 300' 600'

APPROXIMATE SCALE IN FEET

LEGEND

HS-07 SOIL AND GROUNDWATER SAMPLE LOCATION

MW-6 EXISTING MONITORING WELL LOCATION

CSEV COLORADO SOIL EVALUATION VALUES

mg/kg MILLIGRAMS PER KILOGRAM

REFERENCE STANDARD TABLE	
CONSTITUENT	WORKER CSEV EXCEEDANCE (mg/kg)
Benzo(a)anthracene	**3.9**
Benzo(a)pyrene	**0.39**
Benzo(b)fluoranthene	**3.9**
Dibenzo(a,h)anthracene	**0.39**
Indeno(1,2,3-cd)pyrene	**3.9**
Arsenic	**1.6**

BOLD RED TEXT INDICATES EXCEEDANCE

AERIAL PHOTO: GOOGLE EARTH

Apr 19, 2010 - 10:32am kstanley

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BROWN AND CALDWELL

FIGURE 2 - SOIL SAMPLE EXCEEDANCES
CITY AND COUNTY OF DENVER
HIGH STREET STORM DRAINAGE PROJECT

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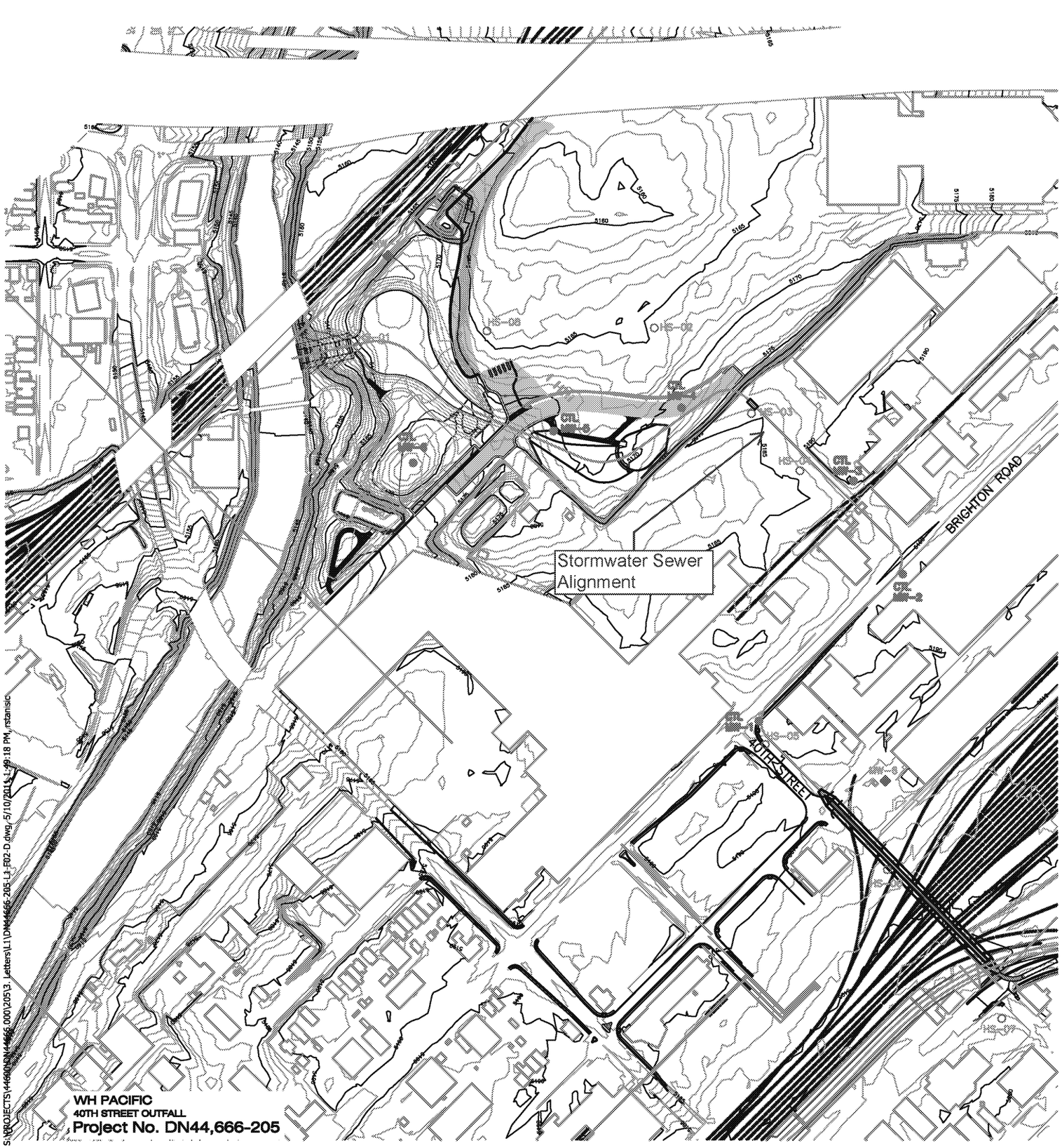

CTL MW-1	
ARSENIC	1.6

CTL MW-2	
ARSENIC	2.2

CTL MW-3	
ARSENIC	7.9

CTL MW-4	
ARSENIC	6.8
P-DICHLOROBENZENE	0.1769
ETHYLBENZENE	0.163
TOLUENE	0.8693
XYLENE	0.483

CTL MW-5	
ARSENIC	3.4

CTL MW-6	
ARSENIC	11.2

HS-01	
BENZO(A)ANTHRACENE	<0.0076
BENZO(A)PYRENE	0.0054
BENZO(B)FLUROANTHENE	0.0064
DIBENZO(A,H)ANTHRACENE	<0.0076
INDENO(1,2,3-CD)PYRENE	<0.0076
ARSENIC	3.5

HS-02	
BENZO(A)ANTHRACENE	0.698
BENZO(A)PYRENE	0.625
BENZO(B)FLUROANTHENE	0.599
DIBENZO(A,H)ANTHRACENE	0.155
INDENO(1,2,3-CD)PYRENE	0.358
ARSENIC	3.7

HS-03	
BENZO(A)ANTHRACENE	<0.0069
BENZO(A)PYRENE	<0.0069
BENZO(B)FLUROANTHENE	<0.0069
DIBENZO(A,H)ANTHRACENE	<0.0069
INDENO(1,2,3-CD)PYRENE	<0.0069
ARSENIC	<2.1

HS-04	
BENZO(A)ANTHRACENE	<0.0074
BENZO(A)PYRENE	<0.0074
BENZO(B)FLUROANTHENE	<0.0074
DIBENZO(A,H)ANTHRACENE	<0.0074
INDENO(1,2,3-CD)PYRENE	<0.0074
ARSENIC	2.5

HS-05	
BENZO(A)ANTHRACENE	<0.008
BENZO(A)PYRENE	<0.008
BENZO(B)FLUROANTHENE	<0.008
DIBENZO(A,H)ANTHRACENE	<0.008
INDENO(1,2,3-CD)PYRENE	<0.008
ARSENIC	<2.4

HS-06	
BENZO(A)ANTHRACENE	0.0441
BENZO(A)PYRENE	0.0423
BENZO(B)FLUROANTHENE	0.0431
DIBENZO(A,H)ANTHRACENE	0.0054
INDENO(1,2,3-CD)PYRENE	0.023
ARSENIC	4.3
LEAD	102
TCLP LEAD	<0.05

HS-07	
BENZO(A)ANTHRACENE	<0.0068
BENZO(A)PYRENE	<0.0068
BENZO(B)FLUROANTHENE	<0.0068
DIBENZO(A,H)ANTHRACENE	<0.0068
INDENO(1,2,3-CD)PYRENE	<0.0068
ARSENIC	<1.9

HS-08	
BENZO(A)ANTHRACENE	1.45
BENZO(A)PYRENE	1.65
BENZO(B)FLUROANTHENE	1.55
DIBENZO(A,H)ANTHRACENE	0.267
INDENO(1,2,3-CD)PYRENE	0.936
ARSENIC	7.4
LEAD	176
TCLP LEAD	0.94

0 150 300

SCALE: 1" = 300'

LEGEND:

HS-01 ○ SOIL AND GROUNDWATER SAMPLE LOCATION INSTALLED BY BROWN AND CALDWELL 2010

MW-1 ◈ SOIL AND GROUNDWATER SAMPLE LOCATION INSTALLED AS PART OF VB/I-70 OU2 ASSESSMENTS

MW-1 ● CTL MONITORING WELL LOCATION

5170 EXISTING GROUND SURFACE ELEVATION (FEET)

NOTES: RESULTS PRESENTED IN mg/kg MILLIGRAMS/KILOGRAM

TCLP LEAD RESULTS PRESENTED IN mg/L MILLIGRAMS/LITER

Summary of Soil Sample Results

Fig. 3

CTL MW-4
TH-17-PM-1 ND
TH-17-PM-1 ND

CTL MW-5
TH-18-FT-1 ND

CTL MW-6
TH-19-RM-1 ND

Stormwater Sewer Alignment

BRIGHTON ROAD

40TH STREET

BLAKE STREET

LEGEND:

HS-01 SOIL AND GROUNDWATER SAMPLE LOCATION INSTALLED BY BROWN AND CALDWELL 2010

MW-1 SOIL AND GROUNDWATER SAMPLE LOCATION INSTALLED AS PART OF VB/I-70 OU2 ASSESSMENTS

MW-1 CTL MONITORING WELL LOCATION

5170 EXISTING GROUND SURFACE ELEVATION (FEET)

NOTES:

ND-NONE DETECTED

N

0 150 300

SCALE: 1" = 300'

WH PACIFIC
40TH STREET OUTFALL
Project No. DN44,666-205

Asbestos Sample Results Fig. 6

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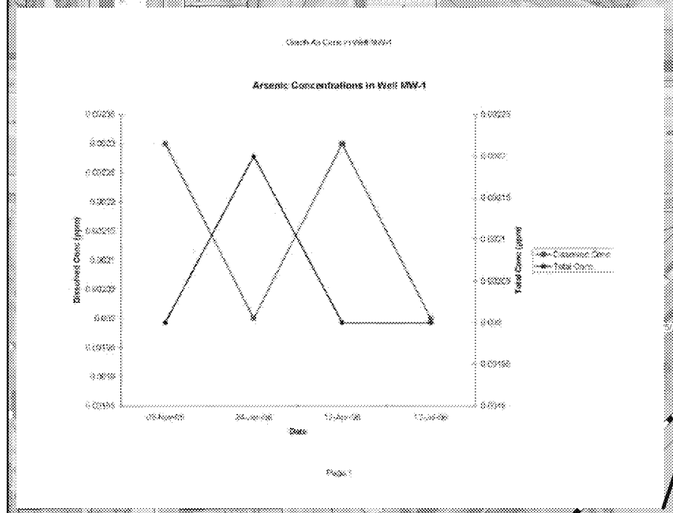
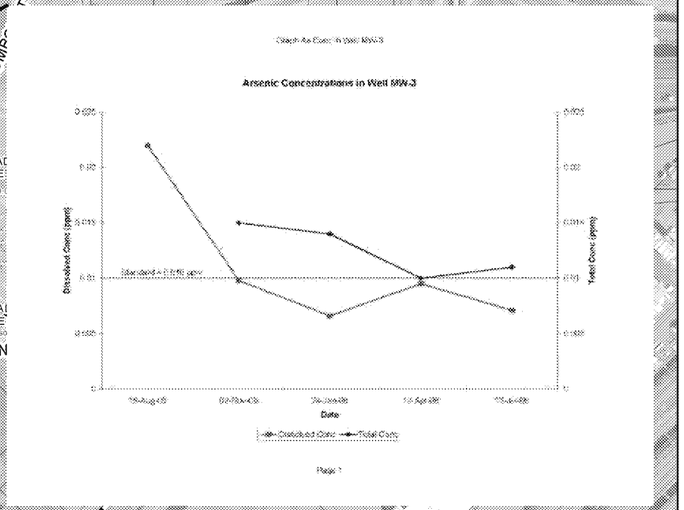
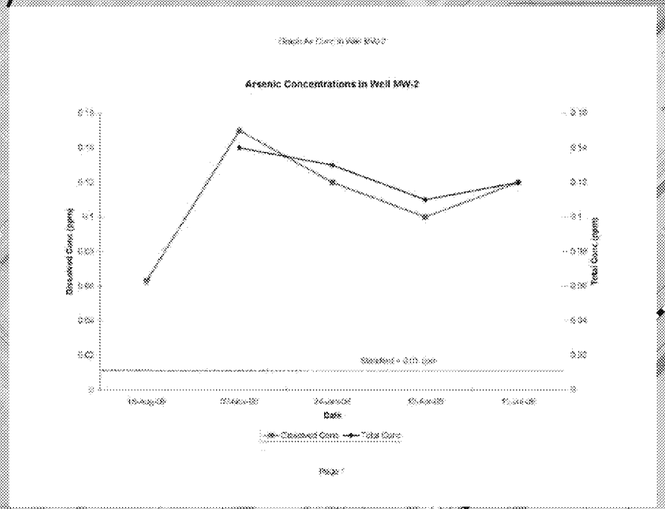
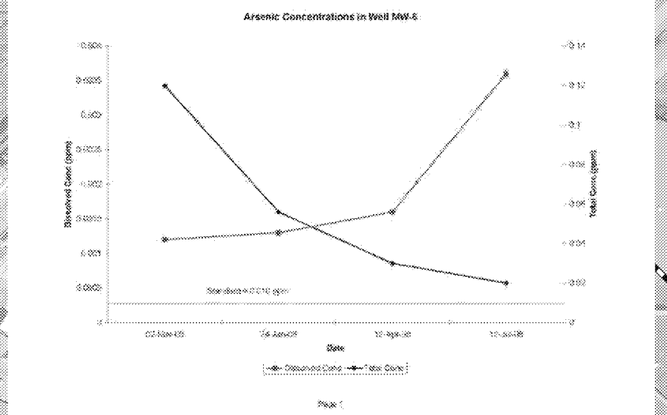
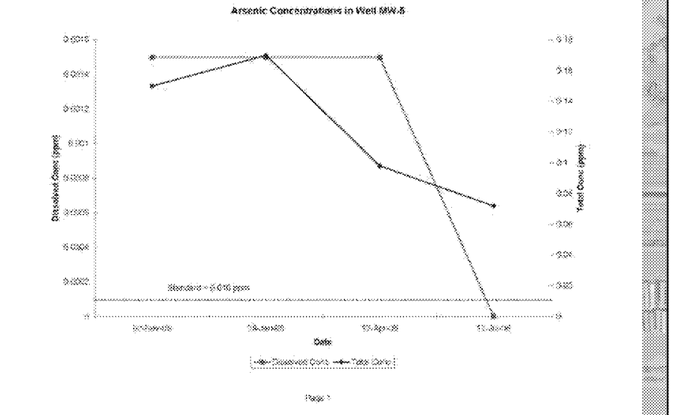
GROUNDWATER











Legend

- GW-SampleLocations

0 150 300 600
Feet

1 inch = 300 feet

N

Figure 22
Arsenic Groundwater Concentrations
VB/I-70 Remedial Investigation

EMSI Engineering Support Management, Inc.

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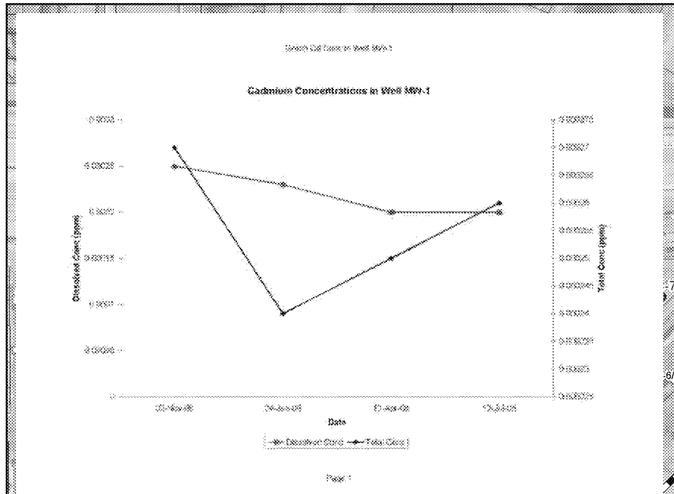

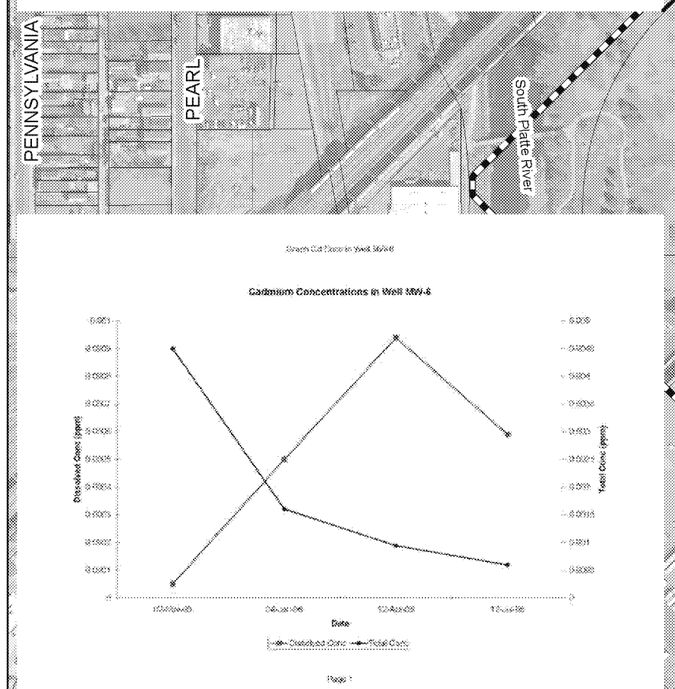

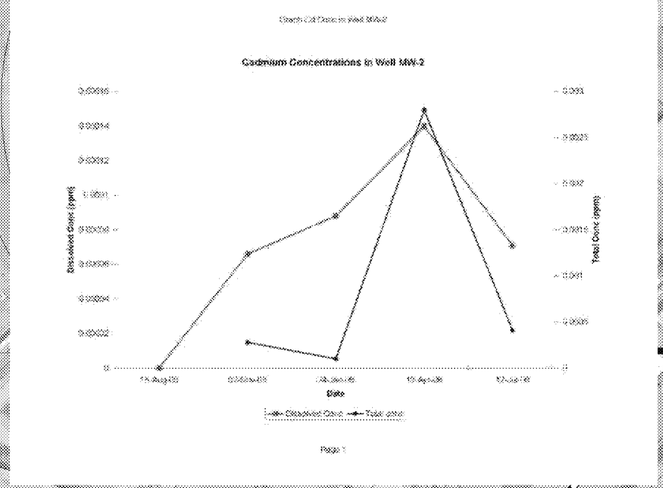

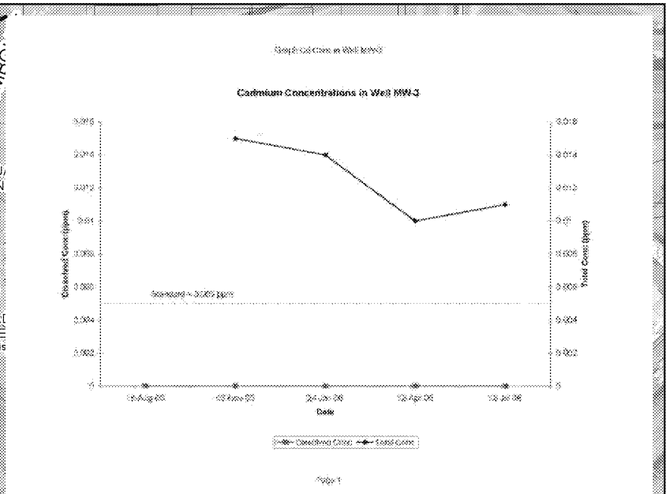

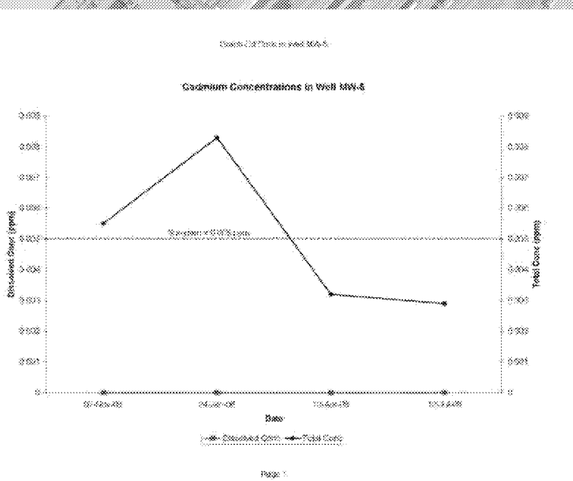

Legend

- Groundwater Sample Locations

0 150 300 600
Feet

1 inch = 300 feet

N

Figure 24
Cadmium Groundwater Concentrations
VB/I-70 Remedial Investigation

EMSI Engineering Support Management, Inc.

Mar 26, 2010 - 4:05pm kstanley

MW-1	
Chloroform	<2.0
Tetrachloroethylene	**12.7**
Trichloroethylene	4.6
Cadmium	<10

HS-02	
Chloroform	1.1
Tetrachloroethylene	1.0
Trichloroethylene	<2.0
Cadmium	<10

HS-03	
Chloroform	3.1
Tetrachloroethylene	2.8
Trichloroethylene	<2.0
Cadmium	**18.2**

HS-01	
Chloroform	<2.0
Tetrachloroethylene	**24.8**
Trichloroethylene	**5.8**
Cadmium	<10

HS-04	
Chloroform	**6.0**
Tetrachloroethylene	<2.0
Trichloroethylene	<2.0
Cadmium	**109**

HS-08	
Chloroform	<2.0
Tetrachloroethylene	<2.0
Trichloroethylene	<2.0
Cadmium	<10

HS-05	
Chloroform	2.9
Tetrachloroethylene	<2.0
Trichloroethylene	<2.0
Cadmium	<10

MW-6	
Chloroform	2.1
Tetrachloroethylene	<2.0
Trichloroethylene	<2.0
Cadmium	<10

HS-07	
Chloroform	0.73
Tetrachloroethylene	<2.0
Trichloroethylene	<2.0
Cadmium	<10

MW-1 HS-01 HS-08 HS-02 HS-03 HS-04 HS-05 HS-06 MW-6 HS-07

BRIGHTON BLVD

40TH ST

38TH

BLAKE

0 300' 600'

APPROXIMATE SCALE IN FEET

LEGEND

HS-07 SOIL AND GROUNDWATER SAMPLE LOCATION

MW-6 EXISTING MONITORING WELL LOCATION

CDPHE COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT, REGULATION 41, BASIC STANDARDS FOR GROUNDWATER

(µg/L) MICROGRAMS PER LITER

REFERENCE STANDARD TABLE	
CONSTITUENT	CDPHE EXCEEDANCE (µg/L)
Chloroform	**3.5**
Tetrachloroethylene	**5**
Trichloroethylene	**5**
Cadmium	**5**

BOLD BLUE TEXT INDICATES EXCEEDANCE

AERIAL PHOTO: GOOGLE EARTH

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BROWN AND CALDWELL

FIGURE 3 - GROUNDWATER SAMPLE EXCEEDANCES
CITY AND COUNTY OF DENVER
HIGH STREET STORM DRAINAGE PROJECT

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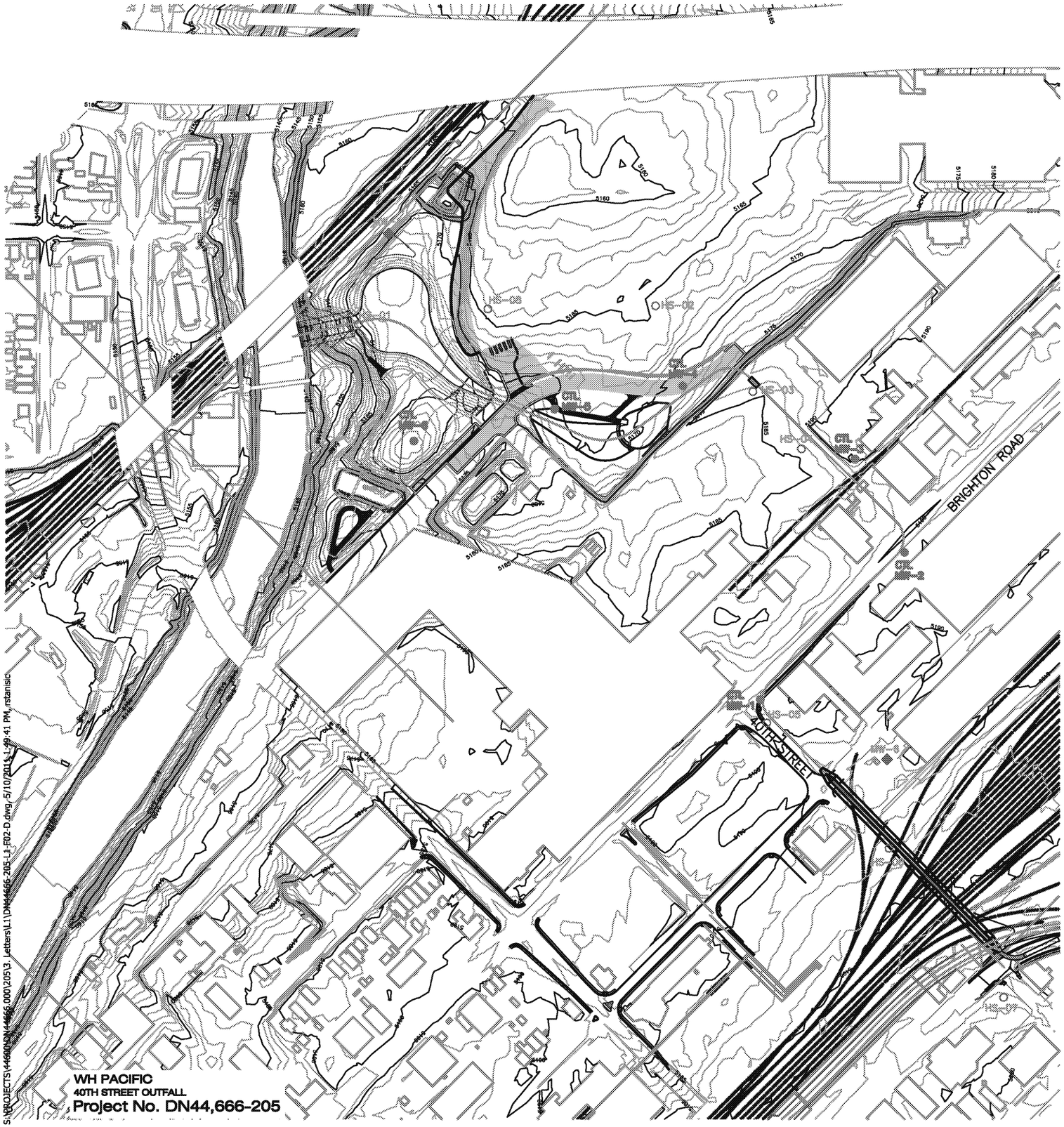

CTL MW-1	
CHLOROFORM	4.1
PCE	1.1
XYLENE	0.99
TOTAL ARSENIC	18.2

CTL MW-2	
CHLOROFORM	1.1
XYLENE	0.81
TOTAL ARSENIC	22.1

CTL MW-3	
CHLOROFORM	2.6
XYLENE	0.73
TOTAL ARSENIC	32.7
DISSOLVED CADMIUM	264
DISSOLVED MANGANESE	92.7

CTL MW-4	
PCE	1.2
CIS-1,2-DCE	0.46
XYLENE	0.75
TOTAL ARSENIC	15.4
DISSOLVED MANGANESE	2140

CTL MW-5	
TOTAL ARSENIC	8.5
DISOLVED IRON	23300
DISSOLVED MANGANESE	775
HEXAVALENT CHROMIUM	<50

CTL MW-6	
PCE	26.3
CIS-1,2-DCE	0.38
TCE	10.0
XELENE	0.71
TOTAL ARSENIC	57.3
DISSOLVED IRON	1900
DISSOLVED MANGANESE	3320
NAPHTHALENE	1.2

HS-01	
CHLOROFORM	<2.0
TETRACHLOROETHYLENE	24.8
TRICHLOROETHYLENE	5.8
CADMIUM	<10

HS-02	
CHLOROFORM	1.1
TETRACHLOROETHYLENE	1.0
TRICHLOROETHYLENE	<2.0
CADMIUM	<10

HS-03	
CHLOROFORM	3.1
TETRACHLOROETHYLENE	2.8
TRICHLOROETHYLENE	<2.0
CADMIUM	18.2

HS-04	
CHLOROFORM	8.0
TETRACHLOROETHYLENE	<2.0
TRICHLOROETHYLENE	<2.0
CADMIUM	109

HS-05	
CHLOROFORM	2.9
TETRACHLOROETHYLENE	<2.0
TRICHLOROETHYLENE	<2.0
CADMIUM	<10

HS-07	
CHLOROFORM	0.73
TETRACHLOROETHYLENE	<2.0
TRICHLOROETHYLENE	<2.0
CADMIUM	<10

HS-06	
CHLOROFORM	<2.0
TETRACHLOROETHYLENE	<2.0
TRICHLOROETHYLENE	<2.0
CADMIUM	<10

MW-1	
CHLOROFORM	<2.0
TETRACHLOROETHYLENE	12.7
TRICHLOROETHYLENE	4.6
CADMIUM	<10

MW-6	
CHLOROFORM	2.1
TETRACHLOROETHYLENE	<2.0
TRICHLOROETHYLENE	<2.0
CADMIUM	<10

N

0 150 300

SCALE: 1" = 300'

LEGEND:

- HS-01 ○ SOIL AND GROUNDWATER SAMPLE LOCATION INSTALLED BY BROWN AND CALDWELL 2010
- MW-1 ◈ SOIL AND GROUNDWATER SAMPLE LOCATION INSTALLED AS PART OF VB/I-70 OU2 ASSESSMENTS
- MW-1 ● CTL MONITORING WELL LOCATION
- 5170 EXISTING GROUND SURFACE ELEVATION (FEET)

NOTES:

RESULTS PROVIDED IN MICROGRAMS/LITERS (ug/L)
PCE–TETRACHLOROETHENE
TCE–TRICHLOROETHENE
CIS–1,2–DCE–CIS–1,2, DICHLOROETHENE
TOTAL–METAL RESULTS PROVIDED BY 200.8 ANALYSIS
DISOLVED–METAL RESULTS PROVIDED BY 200.7 ANALYSIS
(SAMPLES LAB FILTERED PRIOR TO ANALYSIS)

Summary of Ground Water Results

Fig. 4

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LEGEND:

HS-01 SOIL AND GROUNDWATER SAMPLE LOCATION INSTALLED BY BROWN AND CALDWELL 2010

MW-1 SOIL AND GROUNDWATER SAMPLE LOCATION INSTALLED AS PART OF VB/I-70 OU2 ASSESSMENTS

MW-1 CTL MONITORING WELL LOCATION

5170 EXISTING GROUND SURFACE ELEVATION (FEET)

NOTES:

(5185.96) APPROXIMATE GROUND WATER ELEVATIONS MEASURED APRIL 5, 2011

0 150 300

SCALE: 1" = 300'

WH PACIFIC
40TH STREET OUTFALL
Project No. DN44,666-205

Ground Water Elevations Fig. 5

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SOIL GAS

Mar 22, 2010 - 1:27pm kstanley

MW-1

HS-02

CH4	43.4

HS-01

HS-08

HS-02

HS-03

CH4	56.7

HS-01

CH4	0.5

HS-08

CH4	9.8

HS-03

HS-04

HS-04

CH4	0.0

ARKINS

BRIGHTON BLVD

HS-05

40TH ST

MW-6

39TH ST

HS-06

38TH ST

HS-07

BLAKE

0 300' 600'

APPROXIMATE SCALE IN FEET

LEGEND

HS-07 SOIL AND GROUNDWATER SAMPLE LOCATION

MW-6 EXISTING MONITORING WELL LOCATION

CH_4 METHANE SOIL GAS CONCENTRATION (PERCENT OF TOTAL)

AERIAL PHOTO: GOOGLE EARTH

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BROWN AND CALDWELL

FIGURE 4 - METHANE SOIL GAS CONCENTRATION
CITY AND COUNTY OF DENVER
HIGH STREET STORM DRAINAGE PROJECT

ED_002842_00002202-00061

Appendix C

Sampling and Analysis Plan

- Field Sampling Plan
- Quality Assurance Project Plan
- Records Management Plan

Appendix D

Materials Management Plan

Appendix E

Health and Safety Plan

Appendix F

Monthly Report Template

PROGRESS REPORT template
Vasquez Boulevard and Interstate-70 Superfund Site Operable Unit -2

I. HEADING

Date:	*(File each report by the tenth day of each month until demobilization completed)*
Site Name:	Vasquez Boulevard / Intersate-70 Operable Unit-2
From:	XYZ Consultants
To:	Dania Zinner, USEPA Region 8, Oversight Manager
Progress Report No.:	*(sequential numbered series of reports for ease in retrieval)*

II. BACKGROUND

Site No.:	###
Response Authority:	CERCLA
	CERCLIS No: CO###
NPL Status:	Listed
Action Memo:	TBD *(use date of final action memo authorizing this removal to be provided by USEPA)*
Start Date:	TBD *(use effective date of Agreement governing this resmoval action/to be provided by USEPA)*
Demobe Date:	TBD (use *forecast date until demobe occurs then use that effective date)*
Completion Date:	TBD *(use forecast date for delivery of final closeout report)*

III. SITE INFORMATION

A. Incident Category

Time Critical, Private-funded removal action.

B. Site Description

1. Site Location [below is an example of a typical description]

The Vasquez Boulevard and Interstate 70 (VB/I-70) Superfund Site is an approximately four square mile area located in the north-central portion of Denver, Colorado near the intersections of Interstate 70 and Interstate 25. OU2 consists primarily of the southern portion of the Denver Coliseum property (that portion of the Coliseum property located south of Interstate 70, which is owned by the Respondent), the Forney Transportation Museum property along Brighton Boulevard, the Pepsi Bottling Company property along Brighton Boulevard, and various other commercial properties located along Brighton Boulevard. The Removal Action involves primarily of the southern portion of Denver Coliseum parking lot and Globeville Landing Park, both of which are

owned by the City and County of Denver (CCoD).

2. Description of Threat

Arsenic and lead (but particularly lead) have been identified at the Site as the contaminants of concern (COCs). Arsenic and lead are hazardous substances, as defined by Section 101 (14) of CERCLA. The threats posed by this Site include dermal absorption; inhalation of contaminated dust; and the inadvertent ingestion of contaminated soil and surface water.

C. Remedial Investigation Results

Arsenic and lead were detected at levels greater than background and in some locations at concentrations greater than those consider acceptable for commercial/industrial land uses.

IV. PHYSICAL PROGRESS INFORMATION FOR THE REMOVAL ACTION

USEPA Region 8 has authorized contaminated soil and waste removal and installation of containment measures in those portions of the site where stormwater diversion structures are anticipated to be installed under a "time-critical" Removal Action memorandum.

A. Contamination:

Soil contaminated with lead and arsenic is present in both surface and subsurface soil. Solid waste is present in the subsurface beneath portions of the Denver Coliseum parking lot.

B. Cleanup Levels:

The action levels established for the Site are 800 milligrams/kilograms (mg/kg) for lead and 70 mg/kg for arsenic based on commercial land use as the reasonably anticipated land use for the site.

C. Removal Actions to Date:

(Here describe what has been accomplished since commencing the environmental remediation activities or since the last report)

D. Planned Removal Actions for Next Month:

(Here describe what you plan to accomplish by the next report)

E. Key I ssues and Proposed Resolutions

(Describe any technical or regulatory compliance issues ·impacting your plans)

V. DISPOSITION OF WASTES

As of this date, a total of *("reported quantity')* tons/cubic yards of soil/waste has been disposed at the Denver Arapahoe Disposal Site.